

MOTOR AGE

Vol. XXXIV
No. 6

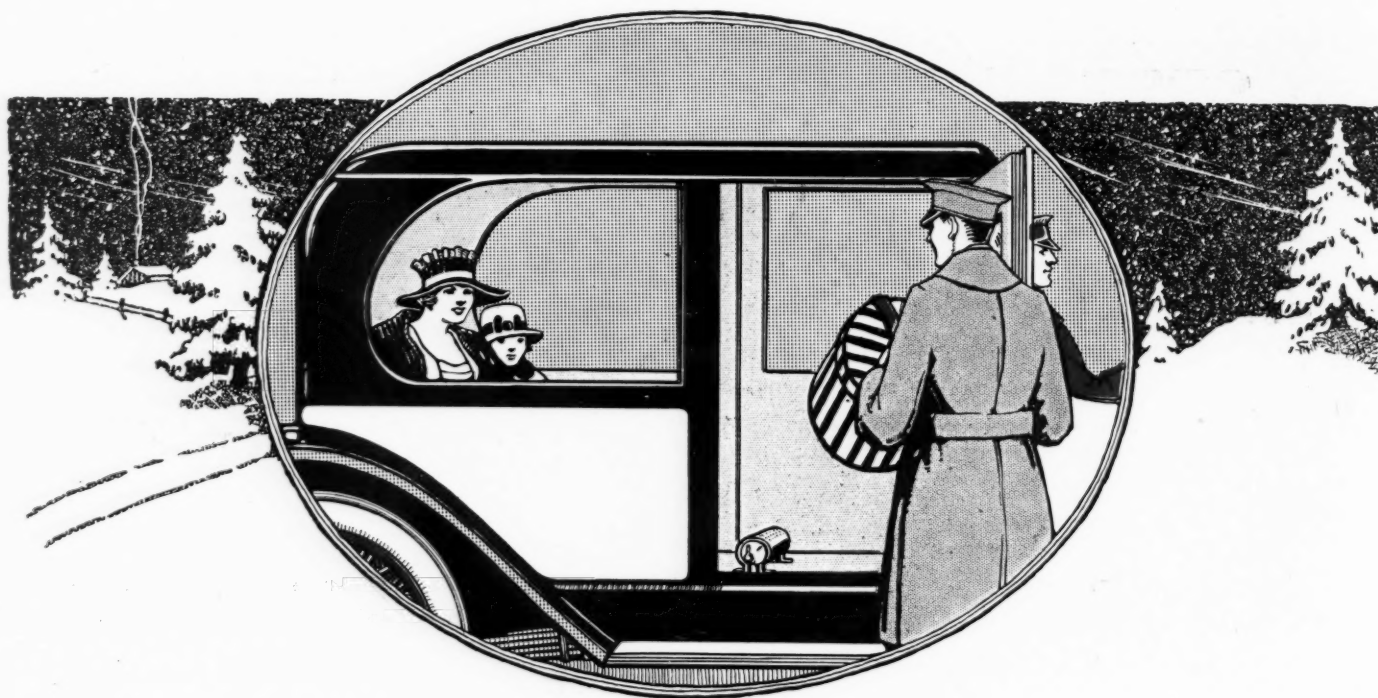
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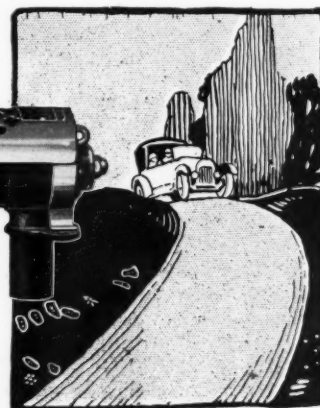
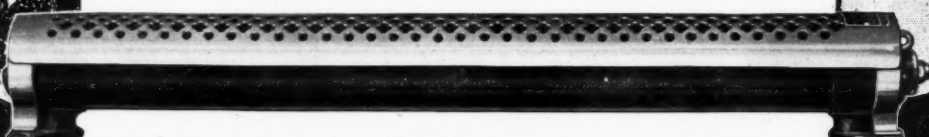
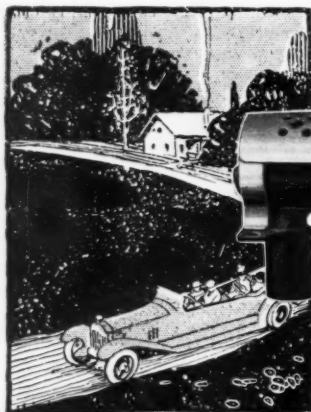
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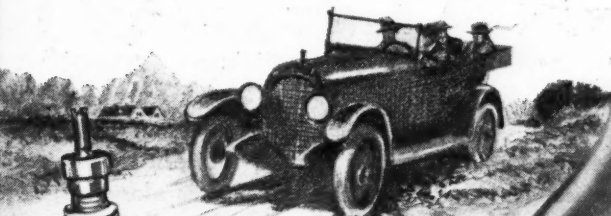
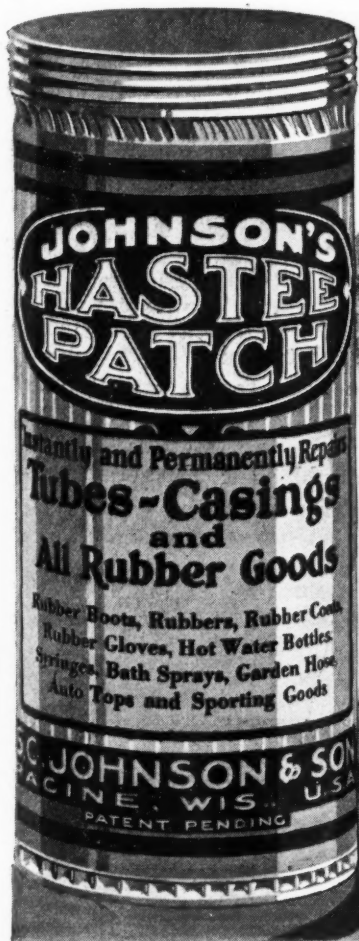
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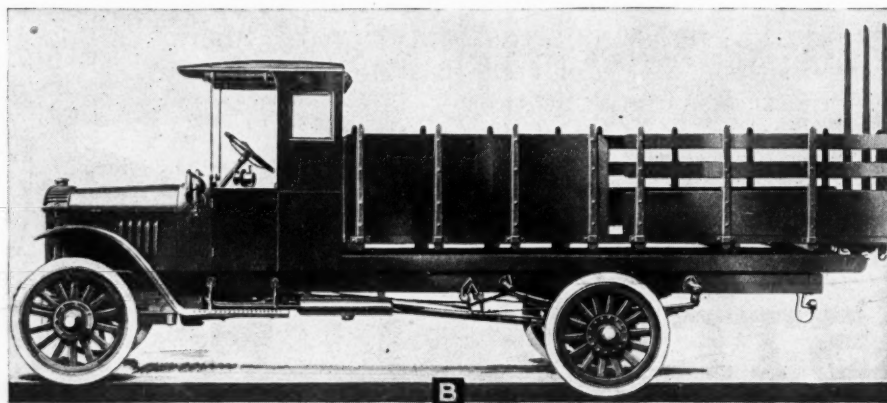
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MOTOR AGE

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CONTENTS

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TRACTOR MAKERS ARE DEMANDING SERVICE	5
What the dealer should do to meet this demand.	
ELIMINATION OF SUNDAY AND NIGHT SERVICE NOT U. S. ORDER BUT PATRIOTIC DUTY	8
EDITORIAL—THE HIGHWAY TO BANKRUPTCY —TAXING THE MOTORIST—SETTLING OLD MAN RUMOR	10
CAR TAX WRITTEN INTO REVENUE BILL	14
REDUCTION OF TIRES MADE IS LIKELY	15
100-HR. NON-ENGINE STOP PARRETT	17
GERMAN VERSUS BRITISH FLYERS	22
SERVICE THAT IS EXCLUSIVELY ELECTRICAL	26
WOMEN'S MOTOR CORPS UNITED	29
FARM EQUIPMENT FOR TRACTOR USERS	30
ELECTRICAL EQUIPMENT OF THE MOTOR CAR	33
MOTOR DEVELOPMENT	40
Universal Airgas manifold, Hodges and Kerosene Equipment carbureter devices described and illustrated.	

DEPARTMENTS

READERS' CLEARING HOUSE	34
MOTOR CAR REPAIR SHOP	43

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MALLERS BUILDING, CHICAGO

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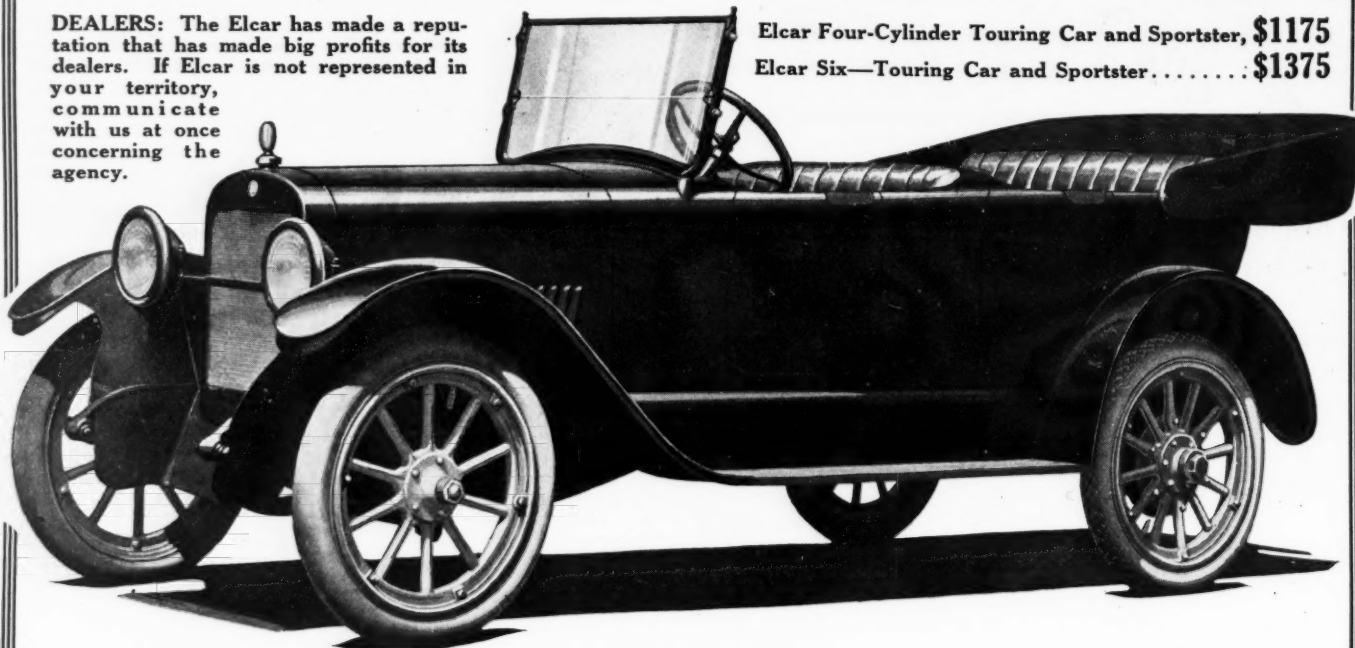
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New Elcar Sportster model, \$1,175 with four cylinder power plant and \$1,375 with six cylinder power plant.

MOTOR AGE

Tractor Makers Are Demanding SERVICE

Branch House Methods of Horse-Machinery Days Are Over

- 1—The dealer must take his service to the farm and the tractor.*
- 2—Small repair stocks must be carried.*
- 3—Rational charges should be made for repairs, parts and work done.*

By David Beecroft

IF you are going to sell tractors to farmers you must make up your mind to give the service necessary to keep the tractor working as nearly all of the time as possible.

This is necessary for three reasons:

1—The tractor manufacturer is demanding that the dealer give adequate service.

2—The farmer has made up his mind to purchase from those dealers who give service.

3—The tractor dealer who expects to remain in it and make money realizes that he must give service and charge for it.

The tractor manufacturer has awakened only recently to the fact that the dealer must handle the service job. The leading tractor makers are refusing to make contracts with new dealers unless they agree to give adequate service.

Branch House Unfitted

The tractor manufacturer has at last become conscious of the fact that already there are so many tractors in use that his branch house, which for a generation has given all the service that was necessary for the general line of farm machinery, cannot give adequate service for the tractor. The branch manager of a leading tractor house in Kansas City is authority for the statement that there is not a single tractor manufacturer to-day who is big enough to

give the necessary tractor service through his branch house. The farmer must have service and the dealer must give it to him.

Tractor manufacturers insist on two aspects of service to the farmer:

a—The dealer must carry a reasonable stock of spares.

b—The dealer must be prepared to deliver to the farmer these spares and make repairs for him.

The stock of spares that the dealer must carry is not a burden.

The amount of money so tied up depends upon the make of the tractor and upon the ability of the dealer to make repairs. The supply of spare parts carried by the dealer will range in value from \$100 to \$6,000. Nearly every tractor maker to-day is insisting on the dealers carrying a small stock of spares of not less than \$100 or \$200. The tractor maker generally allows a discount of 15 per cent on these. Some tractor makers give discounts as high as 30 per cent on spares where large stocks are carried.

With many of the old implement line makers, such as Case, Avery, Wallis, Rumely, Moline, Rock Island, etc., the branch house located in such centers as Kansas City or St. Louis carry a very complete line of spares. These cover all models and all parts. As these branch houses are

not more than 12 hr. from the farthest part of the territory the dealer can order spares from these branches, thus reducing the stock that he must carry accordingly.

Enterprising motor car dealers who have recently taken on tractor accounts are not endeavoring to get from under the burden of carrying spare parts by letting the branch house do it but are stocking up themselves. They realize that sales resistance is reduced by the big stock of spares. The larger the stock of spares, the more days and hours does a farmer see his tractor in useful service. The aggressive dealer may only be 2 hr. by motor car service, whereas he may be 12 to 15 hr. distant from the branch house.

Must Go to Farmer

The second aspect of tractor service is the extent to which the dealer must be prepared to go to the farmer where the tractor is and make necessary repairs and replacements.

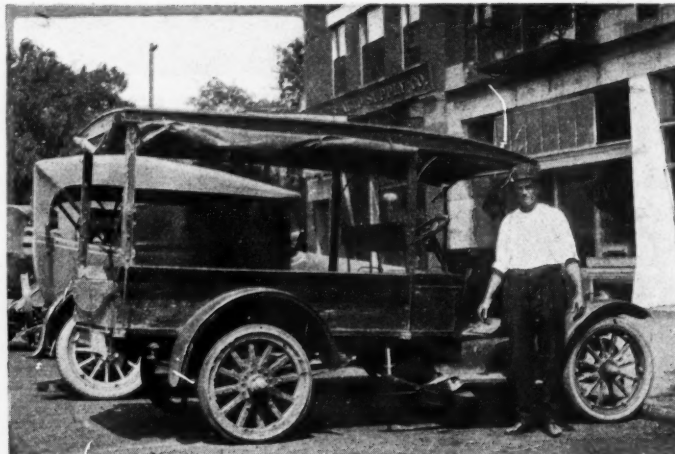
It is imperative that this be done. There is to-day no possibility of evading it. The majority of the farmers do not understand tractors as they should. They cannot diagnose trouble as they should. They cannot make repairs as they should. They cannot make replacements as they should.

The dealer must go to the farmer.

Here is where tractor service differs from



Salesroom of Reykopfs, Topeka, Kan., who sell Waterloo Boy tractors and Republic trucks—They are typical automotive dealers and specialize on tractor service to the farmer



Service truck of Reykopfs, Topeka, Kan. In this Republic truck the Reykopf service man goes to the farms to repair the tractors and give all the service that is needed

motor car and motor truck service. A motor car gets out of commission and the owner brings it to the garage. Not so with the tractor. It remains right in the field where it is plowing or disking or threshing when the break occurs. You cannot tow it to the garage 10 miles away. You cannot even tow it from the field to the barn. If a connecting rod has to be taken up, you do it in the fields. This is diametrically opposite to what happens with the car or with the truck. It is a case of taking the mountain to Mohammed, as Mohammed cannot go to the mountain.

This constitutes a new chapter in the service for the motor car dealer. It is nearly a parallel with the extension lecture course at a university. It is akin to service General Pershing has to give his motor cars, motor trucks, tractors and bicycles on the French front. He takes the repair wagon along with the convoys of trucks and when a tractor breaks down the repair trucks which may be literally machine shops are right on the spot to do the work. There is no time to turn a truck around on the road to take it back to a repair depot.

Resembles War Service

Tractor service resembles this war service. It must be done quickly. We must come to the vehicle with the service rather than bringing the vehicle to the service.

I had an excellent opportunity last week of observing just what motor tractor service means. It was Saturday forenoon in Topeka, Kan., when the temperature was 108, the hottest day Topeka has on record since the weather man was enthroned in the state capital thirty years ago. It was too hot for horses to plow, but not too hot for tractors to plow. July and August are always hot in Kansas. Yet these are the months that winter wheat plowing must be done to raise a good wheat crop.

I was talking to the four Reykopf brothers, who sell the Waterloo Boy tractor in Topeka and also Republic trucks. Tractors and trucks are good selling mates and along with motor cars they constitute the great triumvirate of the automotive dealer, who incidentally is the only kind of dealer we will have in a few years.

The Reykopf phone rang and a farmer 5

miles distant advised that he could not keep the tractor plows in the ground.

The dealer was the only man who knew how to do it. Reykopf tried to settle the difficulty with the farmer over the phone, but it was of no avail. The tractor expert had to be sent to the farm. The Reykopf brothers employ such an expert. He is just a sensible mechanic. He knows engines, ignition, lubrication, carburetion and was not slow in learning how to adjust tractor plows, to set disk harrows and run binders or threshing machines.

Not 20 min. after the farmer telephoned Reykopf had the trouble man in the Republic truck headed for the country and the farmer. Before he left the trouble man



Tractor service man of Reykopf Brothers, Topeka, Kan.—He is not only a good mechanic but understands all about plows and farm machinery

knew what was wrong and while the farmer should have been able to correct the trouble, he did not, but the trouble man was going to teach him how, so that the next time he would know and would not have to trouble the dealer.

Before the repair mechanic got away from the Reykopf store, a period of 20 min., another telephone call from a farmer came. He was threshing and something broke. It had to be repaired at once, otherwise the entire threshing equipment was idle with several wagons that haul the wheat from the field to the threshing machine as well as the crew of the threshing machine. Every idle hour meant a serious loss to such an equipment. The dealer had to give quick service. He gave it.

A third and less urgent farmer telephone call had been received earlier in the morning. This farmer wanted a couple of metal drums to contain gasoline and kerosene. He wanted them delivered. Reykopf had them put in the Republic service truck and when it started off on its farmer service trip there were three farmer calls routed.

Reykopfs have had days when they have used four different cars to take care of all the farmer service jobs that have come up. Reykopfs are in the tractor and truck business in real earnest and no matter how many service calls they receive they will all get prompt attention.

Give Farmers Service

Sometimes farmers do not use nearly so much judgment when the tractor gives trouble as we think they should. One Kansas farmer was threshing wheat and the wind blowing the chaff into the openings of the radiator partly filled these and cut off the cooling. The engine heated and the farmer phoned Reykopf. The trouble man made a long trip and in 20 min. had the radiator cleaned and the tractor was functioning perfectly. This trouble has occurred twice in the last month and yet farmers do not systematically set about to locate the trouble and correct it.

There is no end of the troubles the farmer has with the tractor. One Kansas dealer traveled 40 miles in his service wagon to discover an engine was heating and found the magneto had slipped. Perhaps

the farmer should have discovered this, but he did not and the dealer had to give service.

Generally a farmer can time the valve as the markings on the flywheel make this relatively easy. He can take out shims in the big ends of the connecting rods if the tractor is sufficiently accessible, so that it does not have to be taken apart and practically rebuilt to do this. Some manufacturers seem to have almost forgotten accessibility in their design. After examining some of them you would think that the bearings never burn out or give trouble. Such bearings do not burn out if the farmer give the proper attention, but he forgets to change the oil, sometimes forgets to add oil and the wrist pin ceases or the connecting rod breaks. It makes no difference where the cause of the trouble lies. The fact to keep in mind is that the tractor must be kept working and to do this the dealer must carry the service to the farmer.

Where a farmer's son has taken a course in an agricultural college or a special course at a good motor car school he is able to diagnose nearly all tractor troubles and does not call on the dealer to any extent such as the farmer who is totally ignorant of the machine.

The average farmer is a good prospect for a semi-engineering and mechanical course in tractors. There are 100 things he should be able to do but he is not. He must be taught and the dealer has this job in his hands. Although many tractor makers through the branch houses have done excellent work of this nature, the schools that tractor makers have conducted will be the subject of a later story.

Pay for Service

Many dealers are wondering how all the tractor service is paid for by the farmer. This is a much mooted point. It is a much-discussed argument. Tractor makers agree, and it is generally true, that the farmer is not so much concerned about what it costs to keep his tractor working as he is to keep it working all the time. To him the objective is keeping it working. He has sufficient money to pay for rational service to accomplish this.

Motor car dealers handling tractors are very much divided on this service problem. It is just another and more difficult chapter in the vexatious service question that they



Salesroom and garage of West Motor Car Co., Topeka, Kan., which sells Avery tractors as well as Studebakers, Chevrolets, threshing machines and accessories



J. D. Langley, automotive dealer in Topeka, Kan., who practices what he preaches in giving service on tractors—After selling a tractor he visits the farmer at regular intervals to make sure the tractor is working right

have wrestled with for years with motor cars and trucks.

Service is one of the first rocks the motor car dealer embarking in the tractor agency field will strike upon and he had better survey the situation in advance and pretty nearly decide what he will do. In the end, he will have to charge the farmer for all the service given, and he had better start doing this at once. It may cost the dealer 10 cents per mile to send his service wagon to the farmer, 15 miles distant, to which must be added the cost of the repair part and the expense of the mechanic. He cannot keep on doing this when selling tractors on a 15 per cent or 20 per cent discount and selling spares with a discount of 20 to 30 per cent from the manufacturer.

You must make money on this service if you are to give good service. The farmer may not be willing to admit this, but deep down in his heart he realizes it. He knows it. He respects the dealer for doing it, although he may criticize it.

Farmer Adores Tractor

Psychologically, the farmer is more or less of a paradox in his attitude toward his tractor. He literally adores it, especially if it is half good. He will uphold it to his neighbors and boast of it to the stranger, but when talking about it to the tractor maker or dealer he may complain about it, run it down and seems generally displeased with it. It seems a part of his makeup to not want to give credit to the maker or the dealer.

The making or ruining of tractor service is entirely in the hands of the dealer. He can make or break it, and incidentally, may make or break himself and at the same time, cut into or build up the profits of the manufacturer.

The motor car dealer taking on the tractor must have mental backbone and plenty of it. He will go into bankruptcy if he does not use it. He had better never venture into tractor sales and tractor service than go into it preparing to give free service. Free service is literally a killing job to not a few motor car dealers who are at present selling tractors and handling them on this basis.

Free service and profitable business are not in the same business category. No rule of business ethics corroborating the free tractor service can be found.



Group of farmers and dealers attending an Avery service school in the Kansas City territory. Schools of this character were held in many towns. The school lasted three days and each dealer was expected to get all Avery owners to attend. Owners of other tractors were admitted

Not U. S. Order, but Patriotic Duty

Fuel Board Has Not Curtailed Sales of Gasoline and Oil, but Some State Councils of Defense Have Limited Them to Certain Hours

THE United States government in no instance has placed any restrictions upon the sale of gasoline or oil, nor has it set any definite periods during which gasoline and oil may or may not be sold. Neither has it placed any definite restrictions upon service upon the part of dealers, garagemen or repairmen on cars or on the sale of accessories of motor cars.

Such restrictions as have been placed on dealers in the matter of service on cars or on the sale of accessories have been wholly voluntary upon the part of the dealers through their local or national associations—except in certain states, such as Missouri, where the State Council of Defense and in Chicago, the police, have ordered that all dealers in cars and supplies limit their service and sales to certain days and hours in co-operation with the recommendations of the national and local associations of dealers.

Limitations Placed

Limitations on the sale of gasoline and oil have been placed by the State Councils of Defense in some states, such as Missouri, so that Sunday and holiday sales of oil and gas are prohibited.

In other states, where the dealers in motor cars and accessories have voluntarily, through their local organization, decided to close up on Sundays and holidays, and render no service and make no sales during certain periods, they are endeavoring and probably will succeed in having the fuel supply stations close up.

The movement for curtailment of night, Sunday and holiday service on the part of dealers and garagemen came through the National Automobile Dealers' Association, at the request of the War Service Committee representing the motor car industry. This committee made an exhaustive investigation with a view to determining wherein man power might be saved for war purposes in the motor car industry and made certain recommendations to the Commercial Economy Board, which approved them. The National Automobile Dealers' Association was asked to carry out these recommendations and now has the work in

By Darwin S. Hatch

charge. These recommendations are the ones which the N. A. D. A. is urging dealers throughout the country to observe and which in most of the states and larger cities are being observed and carried out through the local organizations of dealers.

The Commercial Economy Board has not found it necessary to issue any drastic or explicit orders for conservation in any line of trade, and it naturally would be a catastrophe if such an order were issued to the motor car industry before the conservation measure was fulfilled by the dealers.

The whole scheme of the recommendation of curtailment of service during certain hours, and curtailment of sales of gasoline and other supplies during certain hours, is not basically to reduce consumption of gasoline and oil by motor cars but to conserve the man power required for such service.

As a further persuasion to the few still reluctant to act in a patriotic manner and in the uplifting of the trade the National Automobile Dealers' Association quotes below excerpts of a letter received by President F. W. A. Vesper from Mr. Melvin T. Copeland, Secretary, Conservation Division, War Industries Board, as follows:

"We sincerely hope you will succeed in carrying out your program. We trust every automobile dealer will be ready to do everything he can in a practical way to help win the war. This is his duty and privilege as a citizen of the United States. If it appears your committee is going to be unable to put through the program they have undertaken we shall have to call a conference and open the question with a view of making necessary investigation and determine what action to take. We hope your trade will be able to accomplish results without direct intervention by the Government."

There have been so many conflicting statements and more conflicting rumors as to the status of this whole action of the National Automobile Dealers' Association and its basis of authority that the preceding may put the matter straight.

In some localities statements were printed by misinformed persons that the

closing recommendations were direct orders from the War Economy Board or the United States Fuel Administration or some other Federal authority.

So persistent were these reports that the War Industries Board and the United States Fuel Administration found it necessary to issue a joint statement to the effect that such impressions were untrue. The complete statement appears on these pages.

The uncertainty of the authority for the order has been grasped by some who are looking for justification for refusing to comply with the War Service suggestions. The matter is voluntary insofar as the Government is concerned and rests wholly upon the patriotic co-operation of the dealers and gasoline supply stations, except in such instances as those in which the State Council of Defense has issued an order, or as in Chicago, where the service curtailment on the part of dealers and repairmen has been made a municipal order and is being enforced by the police.

Saving Man Power

There is no question as to the saving of man power to be obtained by curtailing night work and Sunday and holiday work in the garages and repairshops. More question has been raised regarding keeping open gasoline and oil supply stations. These require labor which manifestly is for the purpose of making it easier to use motor cars, chiefly for pleasure purposes, and as labor is one of the scarce commodities at this time, every saving in this direction is imperative.

In a recent issue of MOTOR AGE, it was brought out that it might not be wise to set definite hours for closing, which would be applied nationally, that local conditions might make it better, from the standpoint of necessary service, for dealers in different localities to be permitted to settle on the best days and hours at which to close, providing that the intent of the recommendations were carried out. A letter commenting on this editorial from President Vesper of the National Automobile Dealers' Association is given on these pages.

Vesper Answers Editorial on Small-Town Garage

NATIONAL AUTOMOBILE DEALERS' ASSOCIATION, Office of the President, St. Louis, Mo.—Editor MOTOR AGE—Referring to the editorial on page 12 of MOTOR AGE issue of July 25:

It is not the desire to cause any unnecessary hardship to the small-town garage, especially the one catering to country trade. At the same time it would not be a wise thing to make an exception in the general order of things which might otherwise defeat the entire purpose of the movement.

The plan followed with success in some rural districts is the

establishment of an emergency station, which is done by agreement among the garages, whereby a certain one stays open for the purpose of rendering emergency service. In this way, cars that absolutely require attention will be taken care of and eliminate the necessity of all the garages in the small town remaining open to take care of the possible requirements that may be made upon them by the farmers. (Cities are doing this.)

Except in harvest time, special arrangements should be made, notably as in the instance of Minnesota and North Dakota, where at a meeting of the dealers held in Minneapolis it was

decided that during the period of the harvest that they remain open on Wednesday nights and Saturday nights until 9 o'clock, with the understanding that after harvest they would adopt the regular closing policy.

In order that you may be fully familiar with the situation will say that in the greater majority of cases, service rendered at night and particularly on Sunday, is in the greater majority of cases manifestly for pleasure purposes and is not because it is required from the utility standpoint. Therefore, the remaining open of the garage, supply depot and oil station is admittedly for the purpose of making it easy for the owner of a car to use same unnecessarily.

That is exactly the situation that the motor car dealers are trying so hard to overcome because as you know the motor car is thought of as a pleasure vehicle and as such is classified and the industry is accused of—and we haven't very much of defense against the accusation—that the whole fabric of the business is built up on the pleasure idea and if this were not the case, then why do we so plainly in the very conduct of the business cater to that angle of the business.

It is freely said that no other mercantile line in the country keeps open nights and Sundays and those who do are purely personal service businesses, such as livery stables, second-hand clothing stores, fruit stands, restaurants, etc. Surely the importance of the motor car business is such that it should be taken out of this category and take its place where it belongs.

In order that you may get a full idea of our position regarding the night and Sunday closing proposition, I attach herewith a copy of a statement that I made to the business press (published in MOTOR AGE, page 9, issue of July 25), which fully gives the situation as we see it.

I want to assure you that the entire object of the campaign is to build up the business and not in any way retard or embarrass it.—F. W. A. Vesper.

A Few Suggestions from a Dealer in Iowa

OSKALOOSA, IOWA.—Editor MOTOR AGE: The writer has read your editorial, in your issue of July 25, entitled "The Small-Town Garageman," and we want to say that you have absolutely hit the nail on the head, you express our sentiments to the letter—good for you.

We believe that there should be a distinction made between repairshops where service is to be had, in the way of repairs of cars, as between such places as we operate—straight accessory house—and also as between a tire repair house and one which operates a vulcanizing place, and as you say the farmer during these times runs his car virtually only after dark and on Sundays, and making it impossible to secure supplies, or little emergency service is I think a hard blow to him as well as to us who depend on the farmer for a living.

All Not Closing

A few garages, tire shops and accessory houses in this section are not closing as suggested and certain of those who are closing are trying to make it appear that the Government is going to force all to close during the day unless everything and everyone is closed tight Sundays and at 6 p. m. daily.

Here are our sentiments, though they may not amount to much. We all want to do the right thing, that is a cinch; and there seems to be a lack of proper understanding as to what is right. If this is a Government order or request, could you say if there has been any discussion as to just what the Government desired?

We believe that our Government wants to

eliminate as much unnecessary service as possible in order to release mechanics, etc, also that

STATEMENT BY WASHINGTON

"The attention of the War Industries Board and the United States Fuel Administration has been called to the wide prevalence throughout the United States of a mistaken impression that some order or recommendation has been issued from Washington with respect to the sale of oil and gasoline. In some places, local motor car dealers' associations have even issued circulars laying down the rule that dealers in oil and gasoline must make no sale of these products on Sundays and holidays or after 6 p. m. on other days, and stating 'It is now an order from Washington.'"

"No such order or recommendation has been issued by any Governmental authority or with any Governmental approval. The Fuel Administration has urged that wasteful practices in the use of oil and gasoline be stopped and that all reasonable and proper measures of conservation be observed. No limitations, however, have been placed upon the sale of these products."

"It is not intended to interfere in any way with the activities of motor car dealers' associations or others who, after consideration of the local conditions, may seek to bring about some limitation upon the hours during which oil and gasoline shall be sold to the public; but it is desired that it be clearly understood that no orders or recommendations have been issued by any Governmental authority upon this subject."

there must be a saving of gasoline and we all MUST HELP to that end; however, we believe that we can go further than accomplishing the desired result if some means is devised to educate people to do the following:

All those operating a car should understand that it is absolutely necessary they economize at all times in the use of gasoline.

That all cars MUST be equipped with proper emergency repair outfits.

That all who operate cars should be instructed by experts designated by the Government as to the most economical operation of the car which will tend to effect a saving of gasoline and service and upkeep or maintenance, etc.

People should be compelled to report their mileage obtained on so many gallons and possibly this would be the means of securing information as to who was wasting gasoline, and that could be remedied by a government order to have the car inspected.

Instruct the Owners

Again, why not also an order or request to all car owners instructing them in the proper care of tires rather than a campaign to eliminate the enormous abuse of tires by car owners.

Why not start an efficiency campaign and see if that don't effect a greater saving, a saving that would be appreciated by all, a saving that would greatly stimulate the motor car business, and still give to our government all the gasoline needed, all the men needed and give us a few more dollars for War Savings stamps, Liberty bonds, etc.—White Way Auto Supply Co.

New England Develops Return Loads Plan Massachusetts Pledges \$4,000 for Six-Month Trial

PROVIDENCE, R. I., Aug. 3.—Plans for a system of return loads bureaus throughout New England were advanced further following a meeting held here on Thursday which was attended by representatives from all the States in this group. F. W. Aldrich, chairman of the Rhode Island Commercial Economy Board, presided. It was voted that a man should be employed who would devote his entire time to the work of the bureau and that he must be an expert, trained in transportation problems, who should be paid a salary commensurate with his ability. The unanimous opinion was that the main thing was to get a proper start, and thereby avoid the pitfalls in which bureaus elsewhere dropped in starting their operations.

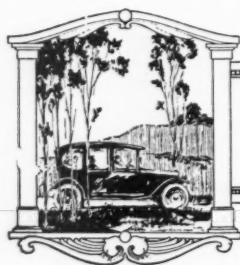
Stoughton Bell, representing the Boston chamber of commerce, reported that his

organization had decided to inaugurate a bureau, following the report of a committee which investigated and favored the plan. He stated that \$4,000 has been pledged to carry the work along for six months, after which it may be self-supporting or nearly so from fees received from those utilizing the bureau. Massachusetts state officials are in hearty co-operation with the plan, and the committee on public safety has pledged \$1,500 toward the expenses of the bureau and has placed at its disposal all the facts and figures gathered by Francis Hurtubis, Jr., chairman of its motor car and truck division, on vehicles and highways in the state in a six months' investigation. The chamber of commerce will put up \$1,000 and the motor truck dealers have pledged another \$1,000. The remaining \$500 has been raised from team-

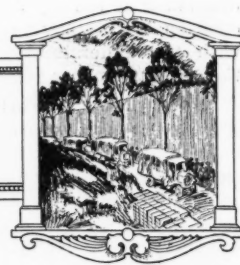
ing and various manufacturing interests.

The Boston Commercial Vehicle Dealers' Association also has been helping.

The Boston chamber of commerce bureau will be ready to begin its operations about September 1 according to present plans. The report of the committee stated that it did not believe the methods in vogue in Connecticut and other states conducting return loads bureaus were going to insure their success, due to the fact that experts are not being employed, and it points out that the Boston chamber of commerce should begin first by the employment of men who know their tasks. It advocates that no action upon the question of rates to be charged for transportation from city to city, or to the responsibility of the truckmen carrying the freight be taken at present until further facts can be secured.



EDITORIAL



The Highway to Bankruptcy?

THE motor car dealer who intends to sell tractors must be prepared to give a little greater service than he has been giving in the sale of motor cars and motor trucks. He must be prepared to take the service for the tractor to the farm rather than having the tractor brought from the farm to the repair shop.

THERE is scarcely a dealer who is not prepared to give this service, and there is scarcely a tractor manufacturer but who realizes that such service must be given. The question the dealer must settle with himself is that of charging for the tractor service. If he has made up his mind to give free service to the farmer, he already has started on the highway to bankruptcy. It cannot be done.

THERE is no necessity for such service. The term service as applied to the tractor does not mean giving parts for nothing or giving free labor for nothing or giving time for nothing. Service as applied to the tractor means doing the work by way of repair that the tractor requires at the time the farmer wants it done. It means that when a part on the tractor breaks at 9 o'clock in the morning the dealer can be on hand by noon or perhaps earlier with a new part and ready to make the repair.

THE farmer expects to pay for such prompt attention. He is willing to pay for it, but he must be made to pay for it. There are some motor car dealers who have been selling tractors for a year and who started out on the assumption that they would give a good deal of free service. They started out sending a mechanic on a service wagon 10 and 15 miles into the country and not making any charge for the work done. These

dealers continued this for three or four months until they discovered that it was a pulling job. Then they stopped. They learned that the farmer is well able to pay for work done. They learned that the farmer was willing to pay for work done when it was done promptly and done well. That to the farmer was the ideal service. He measured the service given by the shortness of the time the tractor was idle. So it is with all farmers.

THE service the farmer expects for his tractor is quite different from that which he expects for his motor car. When the motor car is idle it is an inconvenience and perhaps a loss. When the tractor is idle it is a very serious loss. If the tractor is operating a threshing machine, the loss is particularly severe. If it is operating binders, the case is serious. There is not an instance in connection with tractor use on the farm when it is not a serious loss for the farmer to have his machine laid up. It is something similar to a railroad passenger train running off the track. The whole system is upset. The use of the line as a channel of transportation is entirely interrupted until the tracks are clear. So with the farmer every whit of his farm program is upset when his tractor is incapacitated.

THE carrying of spare tractor parts must not be considered a big problem with the dealer. If he is a good mechanic, it will not be necessary for him to have many hundred dollars tied up in spares. If he is a poor mechanic, he will use more spares and fewer repairs and more money will be tied up correspondingly. The dealer must carry repairs. He should be glad to work for a manufacturer who insists on him carrying them. It is money in his pocket to do it. It means time saved. It means more satisfied customers.

Taxing the Motorist

JUST what will happen next is not clear to the average motorist by any means, or to the maker or dealer, as for that matter. For after reaching what was considered by the average owner the state where he had to keep tab on himself to get repairs and supplies before 6 and on other than Sunday and holidays, besides the increased cost of motor car, repairs, gasoline, etc., a Federal tax and a gasoline tax have been proposed.

THE American motorist is no grouch—even when it comes to a double dose of Federal tax and gasoline tax. He probably will growl a little while and then go on just the same as far

as possible under the new regime, if the measures written into the new revenue bill last week go into effect. With the steel situation and other materials market as they are, the demand long has been greater than the supply, and there is no reason to believe other than that even with the Federal tax and a gasoline tax all the cars that are made will be bought and there will be clamors for more. The main effect of these levies would be on the owner of the low-priced car who is just getting by with expenses as it is and the owner of commercial trucks, for utilitarian though it has been admitted to be, the truck is to be under the same regulation as the motor car. Meanwhile motorist and dealer alike wonder what will come next.

Settling Old Man Rumor

IT seems mighty hard to settle this old man rumor. For no sooner has he been beaten off in one section of the trenches than he attacks some other section. Practically every week this summer it has been necessary to get a statement from the oil authorities at Washington as to the rumored restrictions on the use of gasoline, etc. First there were the seven motorless Sundays—to save gasoline. Then there were the gallon-a-day rumors. They seemed to come in bunches. There was no truth in any. Now old man rumor has seen fit to reappear in the

midst of the dealers' patriotic campaign to conserve man power by closing repairshops, salesrooms, etc., after 6 and on Sundays and holidays.

THERE are no Government restrictions on the sale—or use—of gasoline or oil, nor has there been any Governmental specifications as to the time when gasoline and oil may or may not be sold.



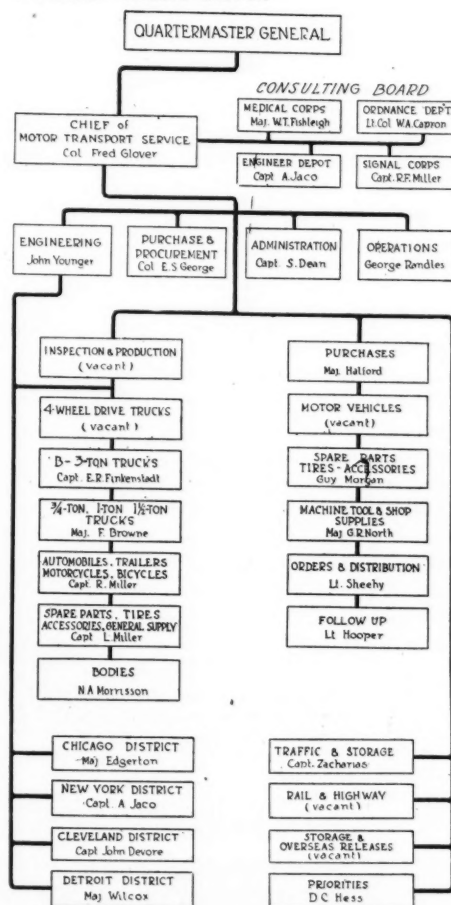
Americans wounded in present fighting arriving at hospital by motor

The Motor Transport Service Charted

WASHINGTON, Aug. 2—Fifteen per cent of the United States Army personnel expenditure averages, service and equipment is said to be in the hands of the Motor Transport Service, which indicates the division's great importance and emphasizes the value of the internal combustion engine in the war. The Motor Transport Service, headed by Col. Frederick Glover, which was created a few months ago, is just completing its organization as shown in the chart. These columns previously have announced the various appointments as made from time to time. The latest include the creation of four branch offices in New York, Cleveland, Detroit and Chicago, which have charge of production and inspection for their respective districts. Capt. John Devore is in charge of the Cleveland district, Major Wilcox of the Ordnance Department, the Detroit district; Captain Jaco of the Engineer Corps, the New York district; and Major Edgerton of the Quartermaster Department, the Chicago district.

More than 6000 of the class B 3-ton standard Army trucks have been delivered to the Government to date. They are being turned out at the rate of seventy-five a day. The original program called for the production of 10,000 trucks by Aug. 1, but a serious delay in the delivery of engines and axles has prevented completion of the program as planned. It now is expected that all of the axles will have been delivered by Aug. 15 and possibly the engines by that same date. The delivery of the first 10,000, it is anticipated, will be completed by Sept. 15. Lieut.-Col. Edwin S. George, who has been in charge of the procurement and purchasing of the Motor Transport Service since its inception, has been pro-

moted to a full colonelcy and now is the second highest ranking officer in the service under Colonel Glover.



Organization of Motor Service

Long-Range Bombing from Air

WASHINGTON, Aug. 3—The feasibility and demoralizing effects of long-range bombing was emphasized here to-day by British flyers recently arrived from the front. The only way, they state, that Germany can be made to realize that it is getting the worst of the war is by bringing the war into Germany and the quickest way we can do that is by air. Six of the principal manufacturing towns on the western frontier of Germany lie within easy bombing reach of the French and British lines. Raids already undertaken over German soil by the British squadrons operating from the Nancy area have had far-reaching results.

Gas, tanks and airplanes, it was pointed out, are the new features of this war. Gas and tanks both can be readily overcome by the use of gas masks and anti-tank guns. Aircraft, however, can be fought to an effective degree only by enemy aircraft. In consequence the possibilities, once the Allied air forces greatly exceed the German, are unlimited.

The following example was pointed out by a British aviator to show what can be accomplished using a minimum quantity of men, machines and money:

"Given 500 machines, each capable of carrying 1 ton of bombs and having a service radius of 200 miles—that is, machines capable of dropping 1 ton of bombs on a given town within a radius of 200 miles from their base and returning.

"Select a single town with a 200-mile radius which if destroyed will vitally affect production of shells or other munitions.

"Divide the 500 machines into twenty-five groups of twenty machines each. To obtain the best moral and physical results, the raid must be continuous. Start the groups with intervals of 1 hr. between them.

Deduct for Failures

"Deduct as much as 30 per cent for engine failure, machines brought down by the enemy and machines failing to find or reach the target. This is an exorbitant percentage to deduct. Under active service conditions of 10 per cent to 15 per cent prove to be nearer the mark. The result will be the dropping of 14 tons of bombs on the town selected, each hour, for 25 consecutive hours, that is, a total of 340 tons of bombs. The effect on the doomed town can scarcely be imagined. It would be reduced to a complete state of ruin and chaos."

Another important factor, it was stated, to be taken into consideration in air raids, is fire. The anti-fire equipment of the larger German towns is capable at the utmost of dealing with from twelve to fifteen fires simultaneously and by calling upon neighboring town for assistance with about five more. This makes a total of twenty. A continuous air raid for 25 hr. would establish hundreds of fires, the vast majority of which would be left to burn out untouched.

Week Adds 250 to Roster of N. A. D. A.

New Enlistments Come from All Parts of the Country—Other Dealer Activity

ST. LOUIS, Mo., Aug. 5—Two-hundred and fifty members were added to the N. A. D. A. roster this week. Half a dozen communities sent in a dozen names each, and the remainder were scattered to the four corners of the country. Maine was well represented as a state and Seattle was one of the leaders among the cities. It was not expected that Denver would contribute another block of a dozen, but they came. Florida and Georgia continued the campaign in those states and the Kansas work goes on.

Many of the memberships obtained in the recent eastern drive have not yet been tabulated at the president's office and for that reason the count there is not entirely accurate. Lists of memberships are filed with the secretary's office at Milwaukee and are reported to the president's office at stated intervals. The same is true of the office of Executive Secretary E. E. Peake at Kansas City. At an early date it is hoped to canvass the lists of the three offices and issue a definite statement as to memberships. A considerable increase is expected to come from the recent eastern campaign.

N. A. D. A. MEMBERS INCREASING

Boston, Mass., Aug. 3—The committee which was organized to get behind the movement to add names of New England dealers to the National Automobile Dealers' Association has decided to continue its work along these lines and the total is now close to 500. There had been some confusion about the membership, some of the truck dealers believing that unless they had passenger cars also as a line they were not eligible to membership. This has been ironed out and so several exclusive truck men have come into the organization. The Boston committee now proposes to appoint sub-committees in all the large centers to cover any new dealers who may enter the field, and to try to get those who still remain outside the fold.

DENVER FOR WAR CONSERVATION

Denver, Col., Aug. 2—The Rocky Mountain Auto Trades Association has secured 100 per cent co-operation from the dealers in Denver on the war service recommendations of the National Automobile Dealers' Association. The plan has been worked out in an original manner. The advertising of the dealers states that:

1—Free Labor—The dealer will refund to each retail purchaser of a motor vehicle all money received by him from such purchaser in payment for the labor of installing parts replaced by the manufacturer within ninety days from date of delivery.

2—Adjustments—Minor repairs, adjustments and service such as adjusting carbureter, adjusting brakes, taking out squeaks and rattles, work on battery or electrical system, cleaning spark plugs, inflating or changing tires, aligning wheels,

etc., etc., and all other work not provided for in paragraph 1, shall be charged for at the dealer's regular rates, with a minimum charge therefore of 25 cents.

3—Service—All so-called "free service" shall be discontinued forthwith, and no coupon books given free or sold at a discount shall be issued, nor recognized, nor coupons therefrom accepted by dealers in lieu of cash, nor shall any other plan designed to result in free labor, service, adjustments or inspection be adopted or practiced. The provisions of paragraph No. 3 herein shall be held to govern in every instance that is not covered by paragraph 1.

Appended to the advertisement are the pen and ink signatures of all the dealers.

ILLINOIS DEALERS IN MEETING

Chicago, Aug. 2—About 400 Illinois and Indiana motor car dealers met at the Hotel La Salle here Tuesday in a conference called by the Chicago Automobile Trade Association to discuss the future outlook of the industry. F. W. A. Vesper, president of the N. A. D. A., was the chief speaker and stopped on his way from Washington, where he has been acting on the special war service committee of the N. A. D. A. Mr. Vesper outlined to the conferees the Federal license tax to be paid by owners next year. He also told his hearers that the present manufacturers' tax on gross sales would be increased.

Regarding the motor car makers' chance of getting steel to meet the demand for new cars, Mr. Vesper had no predictions to make. He pointed out that the Government needed capacity of some 16,000,000 or 18,000,000 tons, leaving the motor car men in a rather embarrassing position so far as filling their wants is concerned. The most difficult work the association has before it, Mr. Vesper said, is to convince

Washington officials of the importance of the motor car industry.

"We have absolutely no official recognition in Washington to-day," he said. This is largely due, he stated, by the industry's being referred to as a game instead of legitimate business. Pianos, he pointed out, are held as educational necessities, while the motor car, representing the third largest industry of the country, has no official standing, and this, he went on, in the face of such brilliant car and truck performance as that at both battles of the Marne and Verdun. Briefly, he said, it is up to the motor car men to convince Washington that its estimate for steel is too high and that unless sufficient allotment is made the motor car industry, it will not be long before we have no cars to sell.

Preceding Mr. Vesper's talk Henry Paulman, local Pierce-Arrow distributor, outlined the \$60,000,000 bond issue for good roads in Illinois, to be voted upon in November. He especially urged the dealers' organized support. Walter Wardrop, editor of Power Wagon, talked on the development of the motor truck.

During the afternoon session the gasoline situation was discussed by an official of the Standard Oil Co., which settled several rumors regarding the excessive taxation and restriction of gasoline. He stated that the large and small oil companies are meeting the demands of the Government to full extent with sufficient fuel for the general car trade and other purposes. His talk was supplemented with blackboard illustrations. He gave his hearers a general idea of the refining process and dwelt particularly upon such matters as gravities, boiling points, etc., in order that the dealer might have a better understanding of what is necessary in the way of proper car fuel.

CHALMERS-MAXWELL SALES

Detroit, Aug. 3—The zone system of sales has been abolished for both Chalmers and Maxwell, and the country has been divided into thirty-seven districts with headquarters at strategic sales points. For executive purposes the entire country is divided into two sections, east and west. These sections are headed by the following, under T. J. Toner, director of sales: East,



The SE-5A is a British plane that has been adopted by the United States. It is expected that it will be equipped with a Liberty engine. Production of these planes has been started at the Curtiss plant

L. A. Smith, assistant director of sales, and Harry W. Miller, assistant sales manager; West, C. E. Stebbings, assistant director of sales, and E. W. Clark, assistant sales manager. In every case the district supervisor will handle Chalmers cars, Maxwell cars and Maxwell trucks, narrowing the field of supervision in putting all three lines in the hands of one man.

AIR CABINET OFFICER WANTED

Washington, Aug. 2—Establishment of a department of aeronautics under the direction of a Cabinet officer to be known as the Secretary of Aeronautics is proposed in a bill offered to-day to the Senate by Senator Harry New of Indiana. The Secretary of Aeronautics would be similar to the minister for aeronautics as established in England. He would have authority over all the aircraft activities of the Government, direct and complete control of all matters pertaining to the designing, purchase or manufacture of aircraft and aircraft equipment intended for the use of the Army, Navy or Marine Corps. The Cabinet member would be appointed by the President, confirmed by the Senate and given a salary of \$12,000 a year.

AIR SERVICE IS RIGHT

Washington, Aug. 2—Hereafter Air Service will be the general term used to denote either the Division of Military Aeronautics or the Bureau of Aircraft Production. Officers and enlisted men will be known as members of Air Service, Military Aeronautics, or Air Service, Aircraft Production, as the case may be. John D. Ryan, chief of aircraft production, will hereafter be known as the director of aircraft production. Brig.-Gen. W. L. Kenly, chief of the Division of Military Aeronautics, will be known as the director of military aeronautics.

ANNUAL HIGHWAY MEETING

Chicago, Aug. 3—The annual meeting of the Highway Industries Association will be held in Chicago the first week in October. A meeting of the officers and directors will be held at Lima, Ohio, Monday to plan for the convention and a joint meeting under the auspices of the American Association of State Highway Officials and the association.

May Have Two Motor Service Divisions

Branches for Purchasing and Production, Operation and Training Are Contemplated

WASHINGTON, Aug. 2—Two divisions similar to those in the air service are contemplated for the Motor Transport Service of the Army. One would have charge of purchasing and production, while the other would direct operation and training. The purchasing, procurement and production will continue under the Motor Transport Service, headed by Col. F. Glover, while it is planned to have the operation and training in a separate Army division to be known as the Motor Transport Corps headed by Maj. Barrett Andrews. Major Andrews has been in active service with the American Expeditionary forces for the last year in the Motor Transport Corps of the A. E. F.

Further plans include division of the organization under Major Andrews into two sections, one headed by Lieut.-Col. W. D. Uhler, in charge of operations and convoys, the other to be in charge of training. The chief of the training section has not yet been named, but this section will have the special attention of Major Andrews, who plans to inaugurate a system of training in this country that will give the personnel of the Motor Transport Corps experiences exactly like those they will encounter in France.

Heretofore the operations section of the Motor Transport Service was entwined with the maintenance and recently was under George Randles, who will remain in charge of maintenance.

Twenty-seven thousand and five motorcycles and 25,874 sidecars for motorcycles were purchased by the Motor Transport Service of the Quartermaster Corps from April 8, 1917, to July 1, 1918. This includes all the purchases made by the original Motor Transport Section, which was under Brig.-Gen. Chauncey D. Baker and Christian Girt. During the same period 8809 motor truck ambulances were purchased.

July 1 reports showed 4308 motor trucks of less than 1-ton capacity; 5703 1½-ton trucks; 7987 3 to 5-ton trucks; and 3420 passenger cars overseas.

Prospective deliveries of motor trucks for July were 4787, for August 4355 and for September 4448.

Further standardization has been completed with the adoption of the Indian, Harley-Davidson and solo motorcycles as the standard motorcycles in the general motor transport equipment.

The motorcycles will be known under type letters as follows: Indians, I; Harley-Davidson, H; Solo, S.

Adoption of these motorcycles apparently marks the downfall of the original Liberty motorcycle which was designed by motorcycle engineers for the Army and which was to have been the standard.

Type letters also have been announced to denote the passenger cars used in the Army, as follows: Ford, F; Dodge Brothers, D; Cadillac, C.

The motor Transport Service is now giving attention to trailers and will shortly announce the standardization and type names.

OIL CONTROL IS PROBABLE

Washington, Aug. 2—Federal control of the oil industry will probably be announced within the next few weeks, the plan being chiefly designed to eliminate competition and to fix prices. The control will be used however in the future if occasion demands, to keep up the military supplies of this country and the Allies.

It is now thought that the control will be more or less of a voluntary nature, although the provisions of the Lever bill are available if needed.

Competition will be eliminated by fixing prices of crude oil in the various fields and setting a maximum figure on bonuses.

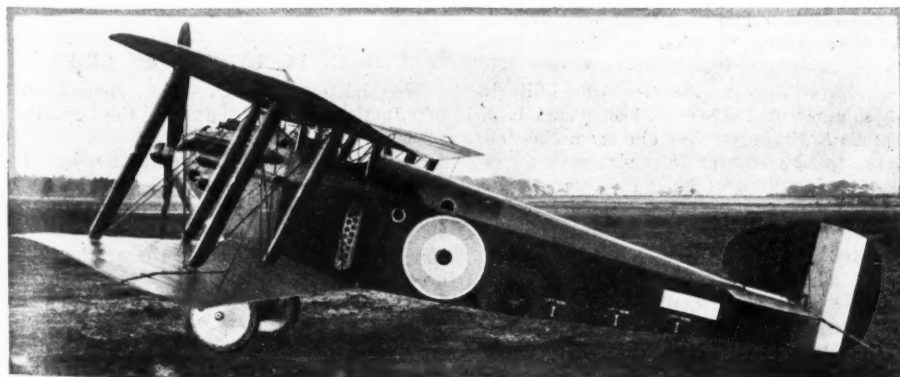
It is likely that a series of price differentials will be issued for the products of the refinery based on the price of crude oil.

1000 IN MILITARY AERONAUTICS

Washington, Aug. 2—The Department of Military Aeronautics, recently organized, has grown to include over 1000 civilian employees in addition to the officers and enlisted men. Thirty stenographers and fifty typists are needed by this department, particularly those who are qualified to take dictation and make transcription in both French and English. Applicants should call upon or address the Civilian Personnel Office, Department of Military Aeronautics, Building D, Sixth & B streets, N. W. Washington, D. C.

DAYTON-WRIGHT SHIPS 1000

Dayton, Ohio, Aug. 2—The Dayton-Wright Airplane Co. shipped Wednesday its 1000th airplane and commemorated the event by giving its employees a holiday. The average daily production of the company is twenty.



The Sopwith Dolphin is fitted with a 200-hp. Hispano-Suiza engine and has a speed of 115 m.p.h. at 15,000 ft. It is the principal scouting plane used by the British today on the western front

Car Tax Is Written Into Revenue Bill

Federal License and Gasoline Levy Proposed by Ways and Means Committee

WASHINGTON, Aug. 2.—No sooner had it been denied by officials here that no tax on gasoline would be considered in drafting the new revenue bill than a tax of 2 cents a gallon was written into the bill. In addition a heavy excise tax on passenger cars, trucks and motorcycles has been added, and the prospect is anything but encouraging for the high cost of motoring.

The tax on passenger cars, trucks and motorcycles is in the form of a Federal license tax. Passenger cars and trucks are taxed by a graduated scale based on the original cost, while the tax on motorcycles is \$5 regardless of cost.

The graduated tax, applying both to passenger cars and trucks, is estimated to yield about \$125,000,000 annually and will be operated under the following schedule:

CARS	TAX
\$ 500 or less.....	\$ 10
500 to \$ 750.....	15
750 to 1,000.....	20
1,000 to 1,500.....	30
1,500 to 2,000.....	40
2,000 to 2,500.....	50
2,500 to 3,000.....	60
3,000 to 3,500.....	80
3,500 to 4,000.....	100
4,000 to 4,500.....	120
4,500 to 5,000.....	140

An additional \$40 tax is included for each \$1,000 or original cost above \$5,000.

A tax on gasoline, of 2 cents a gallon is expected to raise \$45,000,000. The committee believes the gasoline tax will lead to marked conservation of gasoline by reducing its use in passenger cars. Conservation was the principal factor in creating this tax.

Tax on Used Cars

A tax on used cars by a tax on dealers in used cars is contemplated by the committee. Chairman Kitchin stated that some method of taxing used car dealers will be found, as they would escape taxation under the arrangements thus far agreed upon.

A fight over the graduated tax is expected, as the Senate Finance Committee has announced that it will never agree to a tax of this sort, which it believes unfair because of the large reductions in the cost of machines during the years 1915-16. The Finance Committee points out that by the tax on original cost the owner of a car six years old, for instance, would have to pay a larger tax than the owner of a car three years old, while really owning a machine inferior in construction and considerably less valuable because of the age. This procedure should be reversed, says the committee.

The tax on trucks is said to be tentative, and there is a probability of a lower scale to be arranged later for trucks only, owing to their utility.

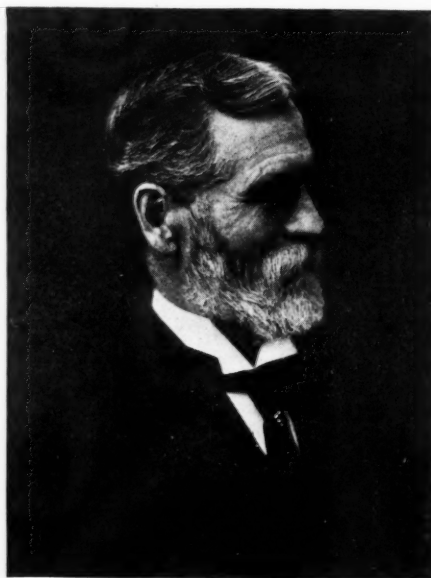
The tax on gasoline is to be paid by the manufacturer or producer, but it is expected that it will be passed on to the consumer by them.

The following figures are based on the present price of the largest touring mod-

els of the cars named, and give proposed tax as applied to various passenger car makes:

CAR	PRICE	TAX
Ford	\$ 450	\$ 10
Dodge	825	20
Studebaker 6.....	1,795	40
Chalmers	1,690	40
Hudson	2,050	50
Paige	2,055	50
Hupmobile	1,350	30
Chandler	1,795	40
Cadillac	3,220	80
Marmon	4,100	120
Premier	1,585	40
White	5,000	140
Stutz	2,855	60
Mercedes	4,000	120
Winton	3,850	100
Packard	4,300	120
National	3,420	80
Pierce Arrow	6,500	180

Francis E. Stanley



FRANCIS E. STANLEY, one of the originators of the Stanley steam motor car, was killed in a motor car accident July 31 while returning to Newton, Mass., from Maine.

The first Stanley steamer was built in the summer of 1897, and three years later Francis E. Stanley drove one from Newton, Mass., to Lewiston at 18 m.p.h. with a gasoline consumption of 7 m.p.g.

The Field machine at Lewiston, Me., in 1887 turned the attention of the Stanley brothers to the steam vehicle, and the Stanley car may be said to date from that time. Thirteen years afterward Francis E. Stanley drove a Stanley steamer over the 10-mile stretch between Lewiston and Turner, Me., in 30 min., an average of 20 m.p.h. Four passengers were carried.

The first Stanley steamer sold was in 1898 in August. Before the last of December 100 orders had been booked. In the

spring of 1899 the business was sold to John Brisbane Walker, and he in turn sold a half interest to Amzi L. Barber and the two companies, the Mobile and the Locomobile Co., were organized and commenced business.

The Stanleys resumed manufacture in 1902, having made several very important inventions, and the manufacture has continued from that time to this.

In motor racing Stanleys won considerable prestige. In the early meets at Florida Louis Ross with one of them beat foreign and American drivers of high-powered gasoline cars on the stretches of Ormond Beach. Then Fred Marriott came along another year with a Stanley and created the mile record of 28 seconds. And in the two miles a minute race the only two machines to do the distance in that time were the Stanley and the Darraq. When Marriott was nearly killed trying to break the record for the mile at Florida in the little tin kettle the Stanleys decided to retire from racing.

The Stanley policy was to build as many cars without striving for production as the plant could take care of easily. And if a man came in for a car, and he made any comment about the price, he would be told that he did not have to buy the Stanley, and sometimes the purchaser would be shooed away because of such remarks. There was no ostentation about either of the two twin brothers and they had no dreams of piling up wealth. The company was reorganized with western capital more than a year ago and the Stanleys retired from active participation in it, though Francis E. Stanley kept in touch with the factory, which was in charge of his two sons-in-law, Prescott Warren and Edward M. Hallett.

McNAMARA BEATS FREIGHT

New York, Aug. 2.—Ray McNamara, driving a Maxwell truck loaded with supplies from San Francisco for the Army, arrived here to-day, having made the trans-continental run by Salt Lake City, Omaha and Chicago since July 17. This beats practically all fast freight train records and establishes a new one for long-distance performance by a loaded truck. The truck covered 200 miles a day and reports an average of 12 m.p.g. of gasoline. The supplies were from Australia and will be shipped to France. The truck used pneumatics and had only one puncture on the entire trip.

I. H. C. TO DISPOSE OF LINES

Washington, Aug. 3.—The Department of Justice states that at the ensuing term of the Supreme Court the International Harvester Co. will dismiss its appeal from the decree of the District Court adjudging it a combination in restraint of trade and ordering its dissolution. The effect will be to leave the original decree of the District Court as the final decree in the case. In part, the decree will compel:

The International Harvester Co. to dispose of the harvesting machine lines known under the trade names of Osborne, Milwaukee, Champion, the trade names themselves, and all patterns, drawings, dies, blueprints, jigs and other machines and equipment

used in the manufacture of those lines, to a responsible and independent manufacturer or manufacturers of agricultural implements.

The company to also dispose of the plants and works at Springfield, Ohio, and Auburn, N. Y., where the Champion and Osborne lines are made.

If not otherwise disposed of in one year after the close of the existing war, the implements will be sold at public auction to the highest bidder.

After Dec. 31, 1919, the company will be prohibited from having more than one representative or agent selling agricultural country.

SCRIPPS-BOOTH ADVANCES PRICES

Detroit, Aug. 2—The Scripps-Booth Corp. advanced the prices of its cars Aug. 1, as follows:

MODEL	NEW PRICE	OLD PRICE
T-Six-39	\$1,385	\$1,195
Roadster six-40	1,385	1,195
G-Four	1,065	985

The price of the new sedan and coupe sixes, models 41 and 42, is \$1,985. These models will have silver trimmings instead of nickel. Samples of the new semi-coupe, model K, are finished and production will begin immediately. The eight-cylinder remains \$1,285.

The company produced 750 cars during July.

KLAXON PRICES ADVANCE

Newark, N. J., Aug. 2—The Klaxon Co. has increased its prices, adding 5 per cent to the current list prices. By this method the consumer will stand the increased price, not the distributor, wholesale or dealer. The new list prices, effective July 18, are:

MODELS	OLD PRICE	NEW PRICE
20-L	\$25.00	\$26.25
20-S	25.00	26.25
20-Deck	27.50	28.88
12-L	14.00	14.70
12-S	14.00	14.70
6	7.00	7.35
6-Deck	8.50	8.93
5	6.00	6.30
3	4.00	4.20
3-V	4.00	4.20
3-MC	3.75	3.94
3-VMC	3.75	3.94

OLDSMOBILE INCREASES PRICES

Lansing, Mich., Aug. 2—The following are the new prices of the Oldsmobile models:

MODEL	NEW PRICE	OLD PRICE
37	\$1,395	\$1,295
45	1,700	1,550

HEROES NAME NEW FIELDS

Washington, Aug. 2—Four new flying fields in the neighborhood of Hazelhurst Field, Mineola, L. I., have been completed and named after aviators who died in the service. They are under the command of Maj. C. K. Reinhart. The field at Wantagh, L. I., has been named Lufbury field in memory of Major Raoul Lufbury. Field No. 2 at Mineola is now known as Mitchel field in honor of Major Purroy Mitchel. The field near Babylon, L. I., is named the Henry J. Damm field in memory of Lieut.-Col. Henry J. Damm. The field at Commack, L. I., is designated Brindley field in memory of Maj. Oscar A. Brindley.

Reduction in Tires Made Is Likely

War Industries Board Asks 50 Per Cent Cut During August and September

WASHINGTON, Aug. 2—The War Industries Board expects the use of tires to be restricted to war and essential business purposes, though just what steps will be taken to restrict the use to such purposes has not been made known. However, the board has asked the rubber industry to cut production of pneumatic tires and tubes during August and September 50 per cent of the production in the corresponding period of 1917, and the request is considered to amount to an order.

This step was taken after a recommendation to the board by the War Service Committee of the Rubber Association of America, which also suggests that the use of tires be restricted to essential war and business purposes. As a means to this end the committee has proposed a Federal licensing system for cars and trucks so that every one can be checked and the essential or non-essential character of its purposes be determined definitely.

More than 600 representatives of the rubber industry gathered here yesterday to go over with the War Service Committee of the Rubber Industry its recommendations for the importation, allocation and use of rubber, following the closing of the first quarter of the year during which Government restrictions on imports were to be effective.

Three Months Up

Last April the Government ruled that during the three-month period commencing May 6 and ending July 31, only 25,000 tons of rubber might be imported, and that during the year, May to May, the total importation might be only 100,000 tons. The expiration of the period was the occasion for the gathering.

In consequence of recommendations made by the War Service Committee, the next period is to be of only two months' duration, the understanding being that in that period the rubber industry is to furnish the Government with additional data upon which to decide what quantities may be imported during the remainder of the year.

The War Trade Board has ruled that during August and September, rubber may be imported at the same rate as for the initial quarter of the year, at the rate of 100,000 tons a year. The rate of allocation by the Rubber Association of America, however, has been slightly altered. During these two months, consumers will have rubber allocated on the following basis:

(a) Government requirements are to be supplied in full.

(b) The remainder to be allocated to consumers at the rate of three-eighths of their consumption during the same period last year. (In the first quarter the rate was one-quarter of seven-sixteenths.)

(c) New consumers will have rubber allocated in proportion to their mill or churn capacity.

Although the production of tires and tubes is to be cut down 50 per cent during August and September, it is not anticipated

that this will cause any great hardship on dealers. The restriction applies only to manufacture, and inasmuch as many tire companies carry fairly extensive stocks on hand, it will be possible for them to supply current demand from these stocks.

The burden apparently will fall most heavily on small manufacturers, and particularly on those who have either started since August, 1917, or who had very small production at that time. At the request of a majority of those present, the War Trade Board is to be asked for a ruling which would permit all manufacturers to base production during August and September on 50 per cent of their average production during the first six months of 1918, though small hope is held out that such a ruling will be obtained.

So that there may be closer co-operation between the War Industries Board and the rubber industry, a new section of the War Industries Board has been created. This will be known as the Textile and Rubber Division and is headed by John W. Scott, who will have supervision over textile matters. Henry T. Dunn, president of the Fisk Rubber Co., Chicopee Falls, is head of the rubber section.

In presenting its case before the War Industries Board, the War Service Committee reviewed at length the various uses to which rubber is put. It pointed out that the entire importation of rubber during 1917 only occupied 3.6 per cent of the total shipping tonnage entering Pacific ports, though it represented 28 per cent in the value of all imports. Now, due to improved packing methods, the same quantity of rubber can be carried in 2.7 per cent of the shipping tonnage.

The committee completed its presentation with an urgent plea for more rubber, stating that unless more is permitted to come in the Government will find itself seriously handicapped for lack of it.

CHEVROLET-G. M. TRANSFER SOON

New York, Aug. 2—It is regarded as probable that the formal transfer of stock between the Chevrolet Motor Co. and the General Motors Corp., by which Chevrolet becomes a division of General Motors, will be effected within a very short time. Although the complete plan has been ratified by both companies, the actual transfer of stock has not been made. That this will be done soon, however, is indicated by the fact that the Capital Issues Committee has taken favorable action on the application of the General Motors Corp. to issue \$28,000,000 additional common stock with which to acquire the Chevrolet property.

PAIGE PRICES ADVANCE

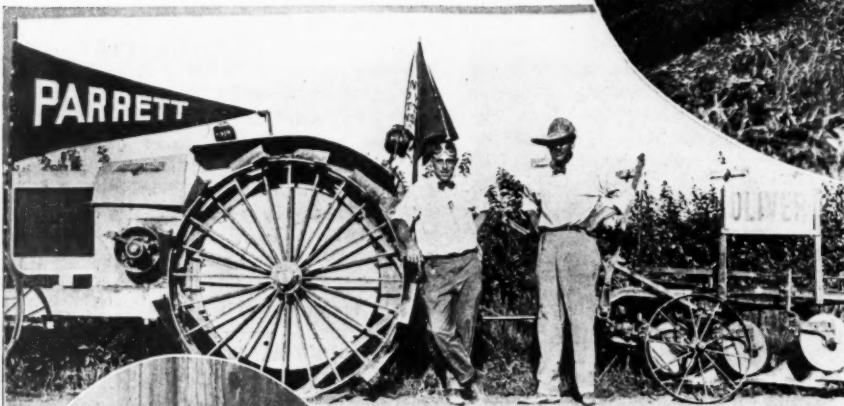
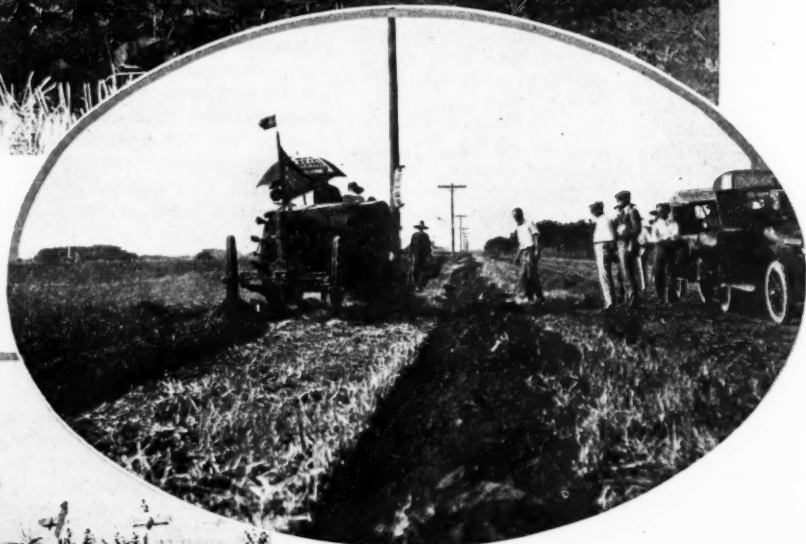
Detroit, Aug. 2—The Paige-Detroit Motor Car Co. has advanced the prices of all its models as follows:

MODEL	NEW PRICE	OLD PRICE
Six-39	\$1,515	\$1,395
Essex six-55	1,985	1,830
Larchmont six-55	2,090	1,950

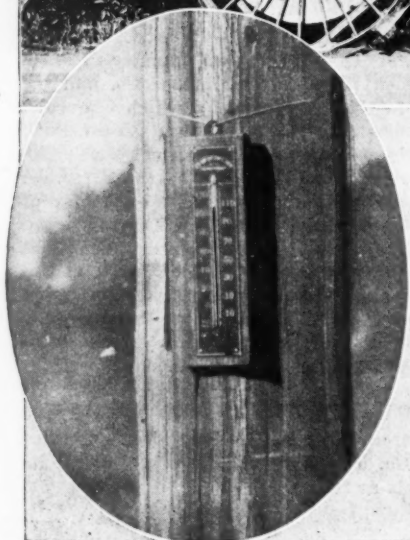
Scenes from Parrett 100-hr. Non-Engine Stop Run at Salina



Above the Parrett is plowing at night in its 100-hr. non-engine stop run, while at the right it demonstrates ease of control in plowing. Below are J. N. Levin, experimental engineer, and H. T. Parrett, service manager, in charge of the run



It was 108 deg. in front of the tent at grounds of Parrett run, as the thermometer shows. A. E. Hildebrand is shown shutting off tractor at end of run



100-Hr. Non-Engine Stop Parrett

Tractor Averages 0.95 Acre Per Hour
with Kerosene Fuel from Start to Finish

SALINA, Kan., Aug. 3—The Parrett model H 12-25 tractor, which started July 26 to make a 100-hr. non-engine stop plowing demonstration on one of the large winter wheat farms 4 miles from this city, has completed its official test, which was conducted by J. B. Davidson of the University of California.

The engine was run on kerosene for 103 hr. 19 min., during which period there were two stops, totaling 5 min. 40 sec., both due to sediment collecting on the bowl in the fuel line between the kerosene tank and the carbureter. Outside of these two enforced engine stops the engine was running all of the time.

It was necessary to stop plowing for 13 hr. 28 min. due to rain, during which time the engine was kept running at 360 r.p.m., which was a good idling demonstration with kerosene.

Records Kept

Throughout the demonstration accurate record was kept of kerosene, lubricating oil and water, as well as the depth of plowing. The tractor plowed for a total period of 80 hr. 42 min. 20 sec., although this was not a continuous performance, there being several stops to take on fuel and make repairs. It was necessary to replace a defective bearing in the left front wheel, requiring 1 hr. 23 min., most of which time was needed for securing the bearing.

Throughout its plowing period the Parrett averaged 2.4 m.p.h. while pulling its three 14-in. Oliver plows. This is quite a remarkable speed and demonstrates the argument that the tractor can work as efficiently at high speeds as at low. Traveling at this speed it averaged 0.95 acre per hour during the entire plowing period.

Kerosene was used as fuel from start to finish. The average consumption was 1.99 gal. per hour. The official report gives the consumption on an hour-acre basis and places it at 2.66 gal. per hour-acre. The term hour-acre is similar to ton-mile in motor truck transportation and has been used as the unit of measurement.

These fuel consumption figures do not give the fuel actually used in plowing but include that during the 13½ hr. when the

engine was idling, the ground being too wet to plow. These figures also include the fuel used during the stops when plows were being cleaned and the tractor supplied with fuel, oil and water. These stops totalled 22 hr. Had the fuel used in the 13½ hr. of idling been recorded the record would then be a valuable one so far as kerosene and oil are concerned.

The consumption of lubricating oil approximated 1 gal. to every 12 acres plowed. During the 103-hr. 19 min. the engine was running, 6.5 gal. of oil were used. On a per hour-acre basis this is 0.084 gal.

The Parrett tractor in this test used a water air cleaner, and 7.5 gal. of water were used in this cleaner. The test unofficially demonstrated that a portion of this water enters the cylinders and serves to keep the temperature of the kerosene mixture down. No other provisions were made for injecting water into the mixture.

During the 103 hr. 19 min. of engine running, 24.2 gal. of cooling water were used in the radiator, which approximates 0.314 gal. per hour-acre.

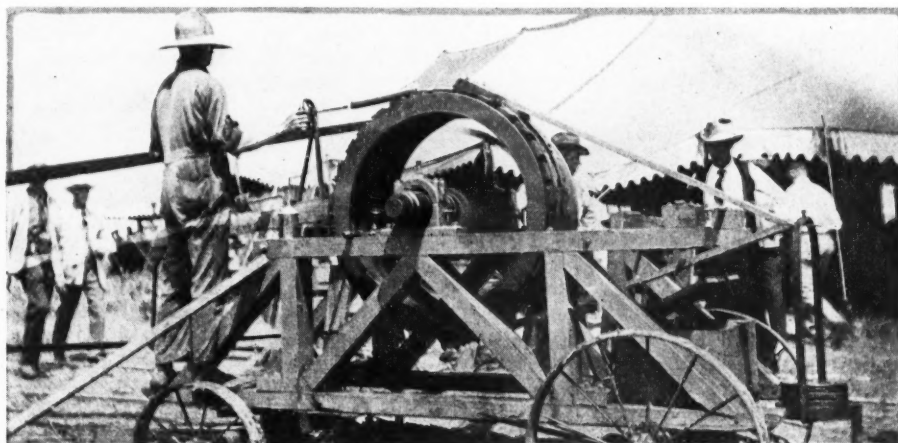
While the official report makes no reference to the feasibility of the tractor for night plowing, this proved one of the valuable features of this demonstration. With the two Prest-O-Lite lamps it was possible to plow at night with the same ease

as in the daytime, and with much more comfort, particularly with the Kansas temperature of 104 deg. This night work was watched with unusual interest, and it is unfortunate that the official report does not contain special records on the fuel consumption at night as compared with the day-time, and also the plowing speed at night as compared with the plowing speed in daylight.

Undoubtedly when the next demonstration takes place there will be many non-engine stop plowing tests. Nothing carries conviction to the farmer so much as these. Farmers buying tractors with which they are not entirely familiar have asked the dealers to give a 10-hr. continuous plowing demonstration, feeling confident that if a tractor will work successfully during that period, it will meet all the requirements the farmer expects of it.

The present test would have been still more valuable if those conducting it had taken recognition of the kerosene consumption during the 13 hr. 28 min. when the engine was idling at 360 r.p.m. on kerosene.

During the official test the depth at which plowing was done was measured 247 different times, and the average depth was 6.36 in., which is equal to that required by all scientific farmers who depend on winter wheat in the Kansas belt.



Prony brake for belt power tests at Salina



Waiting for Fordson to come back across the field



Looking down the line of farmers' cars at Salina

Tractor Demonstrations Great Success

Rules Did Not Give Clue to Relative Merits of Machines—Motor Car Dealers Are Logical Organizations to Handle Sales



Governor Arthur Capper of Kansas gave the signal for the start of the tractor tests Tuesday—General Manager Hildebrand is shown at the right

SALINA, Kan., Aug. 5—The national tractor demonstrations which closed here yesterday will go down in history as the greatest demonstrations of the kind ever held, not only in America, but in the world. The setting for them was ideal. Each day upwards of 100 tractors lined up in a field 1 mile in length. They occupied an entire side of it. Each has had his allotted area to plow. From one side of the field to another was nearly half a mile. Promptly at 1:30 each day, this line of tractors—they were really industrial tanks—started on a 240-acre tract of Kansas wheat stubble, and in less than 2 hr. this was all plowed and in the meantime much of it had been disked and cultivated in other ways. This program was repeated three consecutive days, and while the period of plowing was short the machines kept constantly at it, and whenever a tractor stopped the spectators generally understood that there was some difficulty with it.

The rules of the demonstrations were such that no awards could be made, and while over forty different makes of tractors took private tests on drawbar, fuel consumption, etc., these reports have not yet

been given out. It is a little unfortunate that the rules were such. It gave the impression that these tests were put on very much for advertising purposes, rather than for educational purposes. These tests were optional with the manufacturer and the information was not to be given out by those conducting the tests. Before the information can be given out, it is handed through the manufacturer and he in turn must register it with the association, after which he can give it out if he desires.

This system came in for general criticism on the part of all who attended the demonstrations to learn what the different tractors would do. There were thousands of dealers present who were looking for tractor agencies, but they could not get first-hand and through an official source the results of the different tests. They were thus denied an opportunity of making certain comparisons which they wanted to make to select a tractor that would meet their local needs.

The afternoon demonstrations of plowing afforded little of real value to the dealers selecting a tractor. They were quite similar to a boulevard demonstration of a motor car. The plowing at Salina was not extra difficult but just an average kind. Those who have followed tractors in different parts of the country say that they are at times called upon to do three times as hard work as at Salina. Because of this, it is unfortunate that the Salina demonstrations were not made much more difficult, so that dealers would be able to get an accurate line on their ability to perform.

Very few of the machines gave any trouble whatever during the afternoon demonstrations. There were perhaps half a dozen cases where water had to be added to the radiator. There was no necessity for this, and where a tractor took on water at Salina there was a definite deficiency in the cooling system. Some of these cases were new tractors in which the fan capacity had not been scientifically calculated.

There were fewer cases of heating due to fuel troubles than a year ago, and while more of the machines used kerosene than did a year ago, there was not so much smoke giving evidence of unburned kerosene and oil as last year. One engineer who is a firm believer in gasoline but who used kerosene said that it was relatively

easy for expert operators to give good results from kerosene, whereas the average farmer did not meet with the same results. The kerosene situation is in a better situation than last year, although it must not be forgotten that this fuel is not being well burned in some of the newer machines. They use the hot-spot manifold and in doing so some of them admit they are cutting down the efficiency of the engine by heating the air too much before it enters the cylinders. They also admit that they are giving too much heat and cracking parts of the kerosene, which results in too much carbonization of the engine. Several of them also admit that the unburned kerosene is getting into the crankcase and causing frequent changes of the lubricating oil. Those engineers who claim to have given complete study to the kerosene question still declare that kerosene is not being burned as efficiently as gasoline. Notwithstanding this, there are a great many makers of horizontal engines who are using kerosene and give a guarantee with each machine to the effect that they handle the fuel with entire satisfaction.

Taking Over Entire Sales

One of the most evident situations around the demonstrations is the fact that the motor car dealer is taking over the sale of tractors almost in its entirety. Nothing short of an amazing change has taken place in the last year in this regard. Many of the old line implement dealers who previously held aloof from the motor car dealer have taken him up and admit that the implement dealer who did not handle motor cars is literally a negligible quantity so far as tractors are concerned. This implement dealer has no facilities for giving tractor service, and the makers declare that the tractor cannot be sold without the dealer getting service.

The old days of service from the branch houses of the implement dealer are past. There is not an implement manufacturer who is building tractors who is big enough to give such service. He cannot get a large enough corps of service men to dispatch around the country as he used to in the days before the tractor.

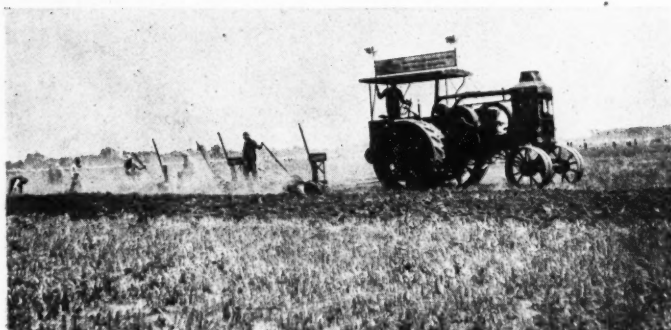
These implement manufacturers frankly admit that the motor car dealer is the only satisfactory person to sell the tractor. He has been in the habit of giving service and charging for it and he will be able to do this with the tractor. This type of dealer has also been in the habit of selling cars for cash, whereas the implement dealer has not. The tractor manufacturer is just as anxious to-day to sell to his dealer and distributor and to the consumer for cash as is the manufacturer of motor cars or trucks.

The Salina demonstrations brought out one difference in the sale of tractors as compared with motor cars. Very frequently the largest sales of motor cars are made in the larger cities of the state. With the



Exhibitor tents at Salina—Each exhibitor had his own tent

Tractors in National Demonstrations at Salina



Rumely Oil-Pull with eighteen disk plows



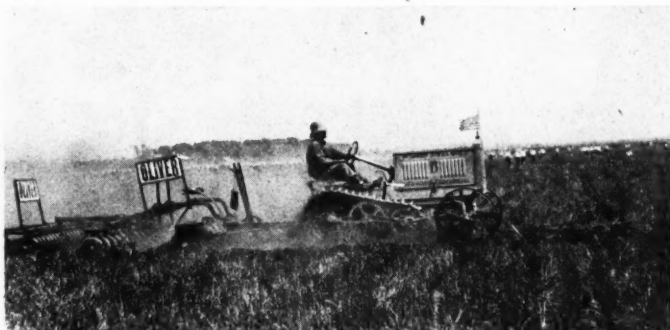
The crawler type Cleveland was a fast machine



Yankee tractor pulling an Oliver at Salina



The operator has easy steering on the Liberty



Bates crawler type disking at Salina



The new small-size Aultman-Taylor tractor

tractor, this is changed. Very frequently the greatest sales of tractors are in towns of 1000 population, and where the sales of motor cars have been relatively small. For example, in the small towns of Mound Ridge and Great Bend, Kan., many more tractors are sold than in the city of Salina, which is ten times as large.

The reason is that the farmer did not object to going 30 or 40 miles from home to buy his motor car, because he perhaps got a greater selection by so doing, but when purchasing his tractor he wants to buy it as close to home as possible. This is because he expects the dealer who sold him the tractor to carry spares and give him service, and he knows that the closer he is to that dealer, the better service he will receive.

Tractor an Accepted Quantity

To the average farmer in the wheat belt the tractor is an accepted quantity. It is recognized as a farm necessity. This is largely due to the difficulty of plowing in the hot July and August weather, when good wheat plowing gives an increased

cost. The farmer is to-day being patient with many tractors that are not half good, as well as with a few that are 100 per cent good. Notwithstanding the troubles he has had with poor machines during the last five years, he has not gone back on the tractor but is as convinced as ever of its superiority for farm work. This is the mental attitude that the dealer, taking up the tractor, has to work with. It can be said as truly of the farmer with regard to the tractor as of the boy with regard to the motor car, namely, that every one hopes to own one sooner or later.

The number of women who operated tractors during the demonstrations was a little indication of what may be done on our farms in the next two or three years. While most of the women were used for advertising purposes, they demonstrated conclusively how satisfactorily a woman can operate a tractor. They also demonstrated how necessary it is in the re-designing of farm machinery to make the control levers easily operated, so that a woman can handle them without undue strain. It is also

necessary to have the tractor controls of rational size and easy to operate.

The Salina demonstrations carried conviction concerning the higher speed at which tractors can operate and do good plowing. It was proved conclusively that the new tractor plows which have the mold-boards shaped so as to turn the soil over properly do this as well at 3.5 m.p.h. as a horse plow does at 1.5 m.p.h. This was a disputed point a year ago. It is not surprising what has been accomplished and it will be surprising if higher plowing speeds are not utilized within another twelve months.

Little Comparison

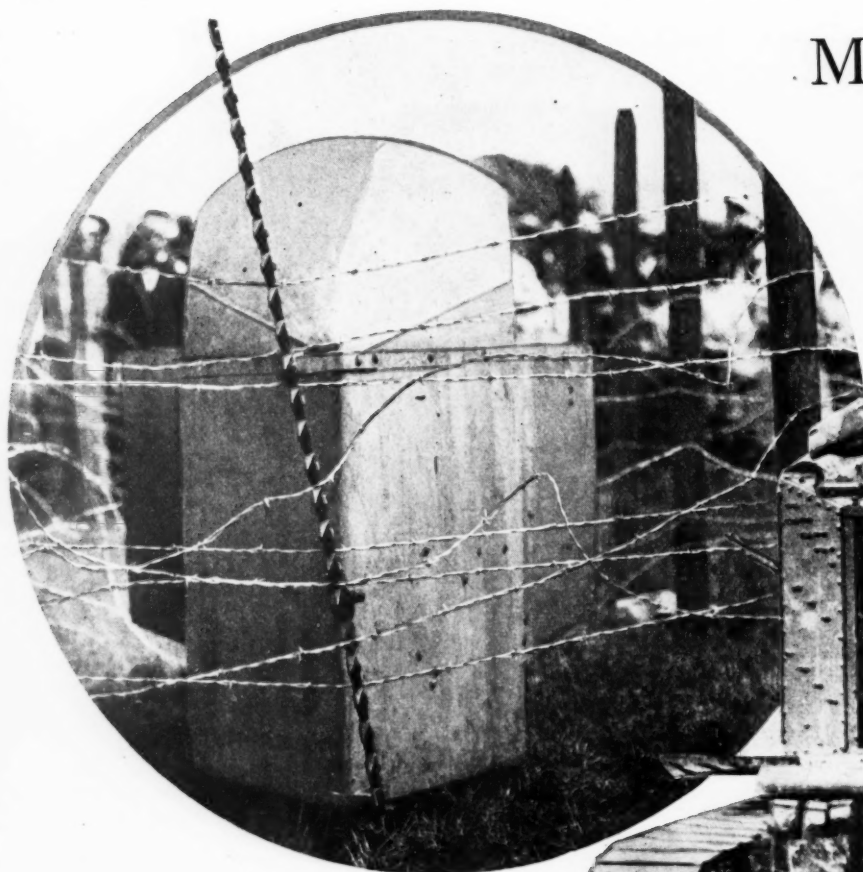
The present demonstrations did not afford much opportunity for comparison among the different types of machines, particularly those using crawler treads and the wheel type. There was nothing in the test which was designed to bring out comparisons between these two types. Practically all the new models are of the four-wheel design.

(Concluded on page 28)

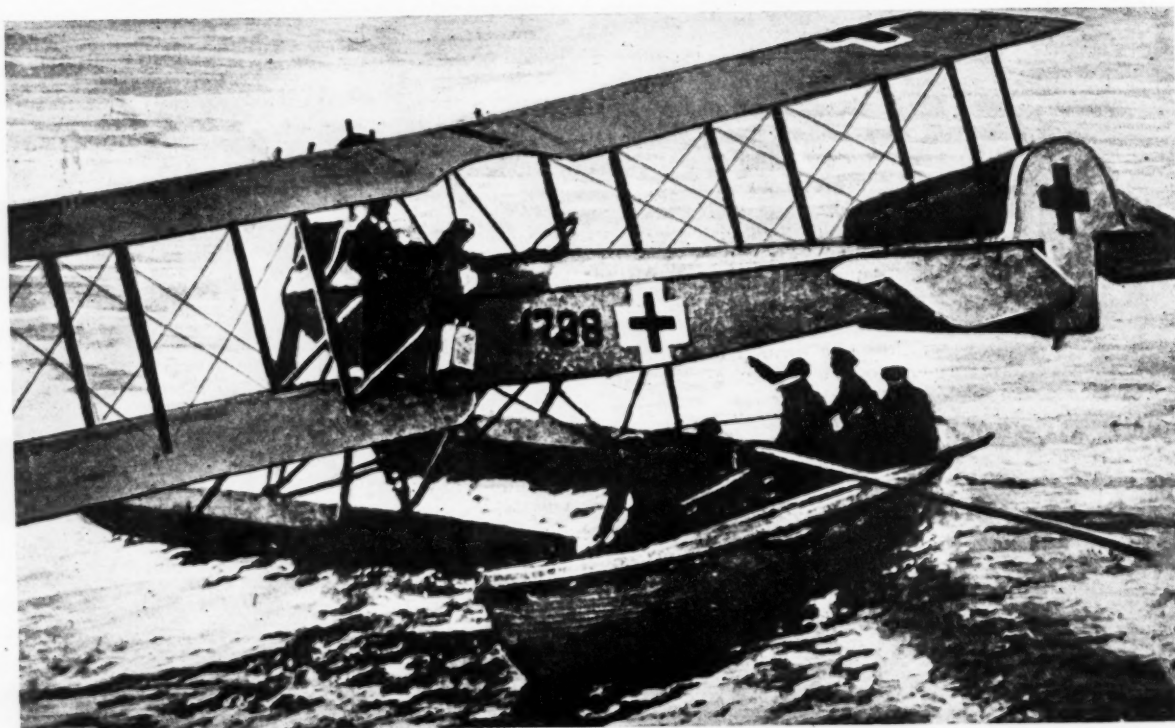
Motors in the War

Baby tank for cutting barbed wire entanglements — the invention of John E. Logan. It can cut through seventy-two wires in 21 seconds

Smaller type of British tank for light work. It is shown here going forward into action, where its quick movement adds to its effectiveness



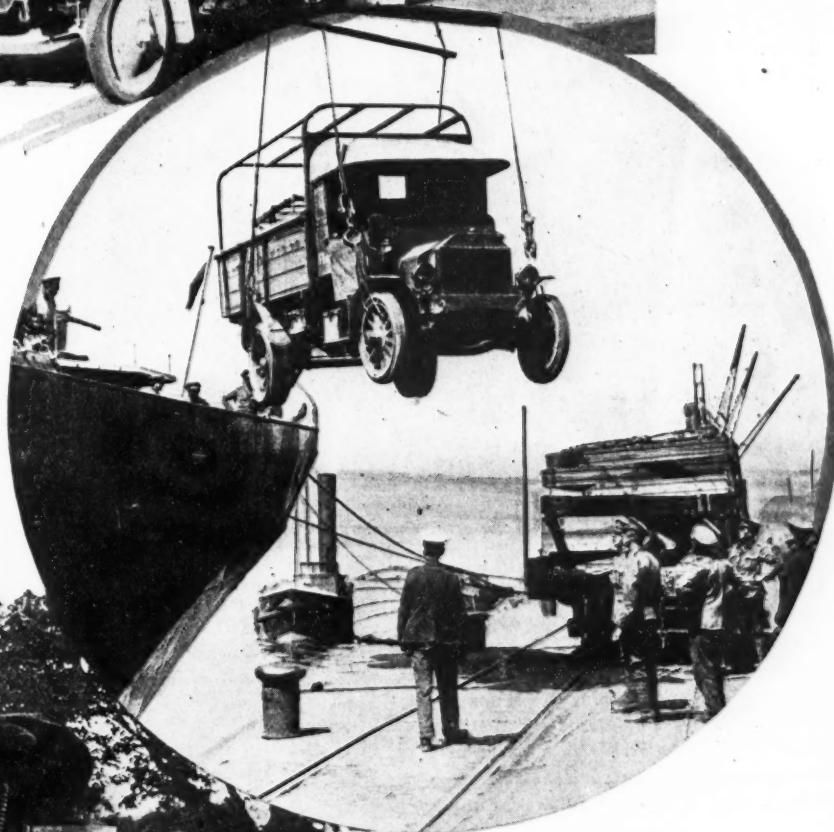
Here is the Friedrichshafener, German seaplane brought down by the British in the North sea. Note that this plane also is plentifully sprinkled with the black cross emblem





American dough-boys had the time of their lives July 4 in London. Here are some of them seeing the sights by trucks

Motor truck en route to the front. It is being hoisted from the ship which carried it from the U. S. to French soil



A truck with its crew of naval air gunners and anti - aircraft guns used in protection of the Italian coast from attacks

German Versus

Motto of Hun—"He who fights and

Major Segraves, who has been wounded several times in air fighting at the Front, explained that it is commanded on the West front by Colonel Von Tomsen, stationed at German general headquarters at Charleville. He in turn is under General Von Höppner at the Grosser General Stab in Berlin. Second in command under Von Tomsen is Major Wildt, a former pilot, known as the "Flugehef," who is directly over a series of staff officers divided one to each aviation unit of the army.

The German squadrons receive their orders and are solely responsible to the staff officers. The squadrons are divided into four classes: Bombing and reconnaissance, artillery, fighting, and photographic. The first two are carried out only when specially ordered. From time to time a long distance reconnaissance is sent out to report on movements of trains, etc. The second, artillery work, is performed by squadrons specially equipped for this duty and for this duty alone, each machine being fitted with wireless.

The Traveling Circuses

Fighting is done by the special Jagdstaffeln or "traveling circuses," as they are called, comprising eighteen pilots, picked for their skill in fighting and fitted out with the latest and best types of machines that Germany can produce.

These squadrons are not numbered or lettered but are called by the name of the squadron commander as "Von Richthofen's squadron," etc.

The traveling circuses have no fixed aerodrome but tour up and down the lines staying usually close to where the fighting is thickest, hence, the name "traveling circus."

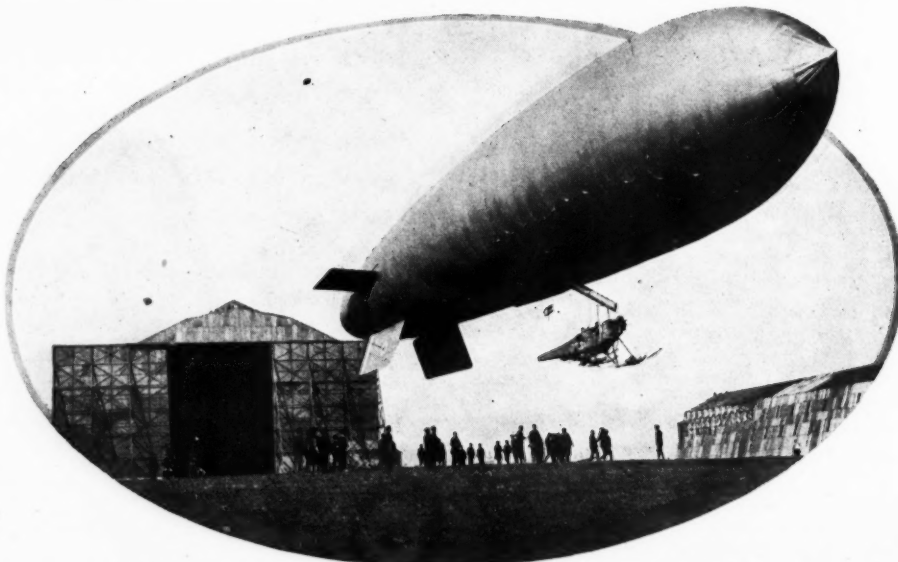
"In addition to the Jagdstaffeln, each artillery squadron has attached to it two or more scout machines which go up and protect the pilots on artillery observation," says Major Segraves, "their duty is not



What was left of Bullecourt village in the Hindenburg line after the artillery of the British finished its work. What appears to be the ruins of a city is shown to be absolutely flat when examined with a magnifying glass. The trenches are prominent. What appear to be numerous small hills are really thousands of shell holes. It is a peculiarity of photography that the shell holes appear as hills instead of hollows in the photographs taken at a height

"HE who fights and runs away, lives to fight another day" is the motto of the Boche airman, according to British aviators in this country. The German reconnaissance or photographic aviator never attempts to secure his information or photographs, states Maj. H. O. D. Segraves of the Royal Flying Forces, when trouble appears imminent. Instead he follows implicit instructions from headquarters and runs.

Describing the German aviation service,



Blimp used somewhere off England to locate submarines and mines

British Flyers

runs away lives to fight another day"

so much to attack as to defend in case of attack when they engage the opponents until the observer is safely away. As a rule these scout pilots are not as efficient as the pilots of the traveling circuses.

"The Germans place far more individual value upon a machine than we do. When a squadron is moved to a different aerodrome the pilots never fly their machines there. They always go by motor truck transport, and for this purpose practically every type of German machine is so made that it can be dismantled in about 15 min.

German Types Vary

"The German machines vary considerably in type. The fighting scouts used principally are the Fokker triplane, Pfalz and the Albatross V A. Baron Von Richthofen, premier German aviator, was shot down while using a Fokker triplane. These machines have a speed of about 116 m.p.h. near the ground and a climb of 10,000 ft. in about 10 min. The engine is a nine-cylinder rotary Oberursel, a German copy of the French Gnome. The next machine, the Pfalz, is practically the same as the Albatross V A, which made its first appearance on the Somme in June, 1917. The performance of the two machines are very similar. Speed near the ground is about 108 m.p.h. with climb to 10,000 ft. in 11 or 12 min.

"The chief bombing machines are the A. E. G., a twin-engine bomber with two 260-hp. Mercedes engines. They are used for short-distance work behind the lines. Other bombing machines include the Gotha and the Friederickschafener, the latter being of the Riesenflugzug, or giant airplane, class. There is no actual machine named Riesenflugzug as many people think. It merely denotes a certain class of machine of giant size, meaning literally 'the giant flying machine.'

"The Gotha and the Friederickschafener types are used for all long-range bombing work, such as the raiding of London. The engines are two 260-hp. Mercedes or Maybachs.

Average Speed

"The average speed of these machines range between 45 to 85 m.p.h. and the ceiling is about 15,000 ft. with full military load of bombs, guns, ammunition, etc.

"For artillery and photography work the Germans usually use the D.F.W., L.V.G., Albatross-type D Aviatik, and the Hanover Fabrick. The latter is easily recognizable by its box tail.

"All the German machines are actually inferior to our machines as regards speed and ceiling. Evan Von Richthofen in his diary complained that his machines compared unfavorably with those of the Allies both in speed and ceiling.

"The same type of engine is almost universally used, the 260-hp. Mercedes, which is of six cylinders, long-stroke, low revolution, upright engine and which has a minimum of parts making standardization easy.



Photograph of German trench positions. On the second road are Germans marching in single file. This photograph is an excellent example of trenches in the general warfare territory, filled with trenches, shell holes and barbed wire. The barbed wire can be seen midway in the picture, and shells from the British artillery can be noticed exploding in the distance. This ground is known as the Hindenburg line. The photo was taken at a height of 1,000 feet

"As regards the pilots themselves, little can be said that is not already known. They seldom attack unless the odds are 3 to 1 in their favor and even then fight only over their own lines. The Hun flies, not for pleasure, but because he has to. He never comes across the lines to seek trouble as the Allied aviators do."

Describing the photographic work, Major Segraves stated that the photographing planes always are accompanied by two or three fighters which aim to protect the photographer, who, contrary to the German plan, sticks to his job despite an attack until he has the pictures he started after. The photographs shown on these

pages were taken by British aviators and in the majority of cases were secured only by "sticking" despite attack.

The system of airplane construction in send in their requirements for new machines to the Air Ministry at London. This division in turn notifies various airplane makers in the country, by special blanks, of just what types of airplanes they require. The forms used tell what the speed, climb, ceiling, etc., must be. Each manufacturer in turn studies the notice and if he believes he can undertake the job so notifies the ministry. He is then sent sufficient money to proceed with blueprints and the manufacture of three airplanes. When these are

completed they are sent to what is called Martlesham Heath, the greatest experimental air field in England, where they are England works for very efficient results. The British air service offices in France given a thorough trial under supervision

of a trial board. Those airplanes found to be best of all sent in by the various makers then are recommended as the new type. Blueprints are ordered from the original manufacturer and sent to each airplane factory with orders for specified numbers.

No Electric Motor Cars in Chile But Conditions for Use Are Good

WASHINGTON, Aug. 2—There are no electric motor cars in Chile. Despite the fact that Chile is a nation populated by 4,000,000 persons engaged in farming and foreign trade throughout large cities, where there are few hills and fair pavements, there are no electric motor cars to be seen.

Gasoline passenger car business is good and there are many agents, but none ever attempted to push the electric, nor did the electric light companies offer an encouragement in this direction. Conditions are especially good in Santiago for the use of electrics, as the streets are paved with asphalt or well-laid Belgian blocks and there

is scarcely any grade. The central station has day circuits, so that facilities for charging batteries could be arranged easily either in the home or at one of the garages. The weather is ideal, for it never gets cold enough to do any damage. The lowest temperature in sixty-five years is 26 deg. Fahr. The rainfall is not excessive, averaging only 15 in. Second-hand gasoline passenger cars have been equipped with home-made bodies and are being used for trucking in competition with two-wheeled ox carts. One of the mines operated by American capital uses some 5-ton gasoline trucks which are the only motor trucks in the

country except a few used for demonstration purposes by large importing houses.

There is a tendency toward the wide spread of this type of conveyance, and it is possible that the electric car will benefit by the movement, but this cannot take place until an active campaign is begun to acquaint the people with what the electric can do. On account of the absence of roads or boulevards in the country the gasoline car has not the advantageous position with respect to the electric which its long-distance touring radius gives it elsewhere. The two points in favor of the electric in the United States, namely, ease of operation and cleanliness, do not apply in Chile, where the owner seldom drives, and it is only within the last year that women have managed cars. One point against the electric is the price, for with the same money or less one can buy a much larger gasoline car, and size is important because the large car looks imposing and because families are large.

The operating cost of an electric would probably run at about the same as that of a gasoline car, as the price of current is high. To be successful in introducing electric



Somme battlefield on the morning of July 1, 1918, showing the British and German front line trenches in the foreground, with no man's land between them. The no man's land is that part containing the lettering P. 23. V 21. The distance across from British to Hun trenches is 80 yards. This photograph particularly displays the immense value of the eyes of the air, the photographing airplane. Without this complete and accurate picture of the enemy's lines, an army would be well nigh helpless—with it, it is prepared, knows the exact artillery range and meets the enemy promptly

vehicles it would be imperative to have a live agent to push them and get concessions from a lighting company in the matter of special rates for current. The agent would have to furnish expert help to keep the batteries in good condition, as few would understand them. If these conditions are complied with, there should be a fair business in this line.

Dry cells and storage batteries are both used for passenger car ignition, the choice usually depends upon the equipment of the car. Since most of the cars are of the cheaper variety more dry cells are used for this purpose than storage batteries.

Various types and marks of dry cells are offered for sale, but the demand is limited and confined to Santiago and Valparaiso, other cities not even taking the number that might be expected in proportion to the population. Complaints have been registered against the dry cells on the ground that they arrive in poor condition and are merely recharged so that they are in service a short time before wearing out.

Lately the product seems to have improved and there is not so much fault finding as usual. In price the cells in the United States have been satisfactory and with the readjustments that are bound to come later they will probably remain, in which case they will lead the market such as it is.

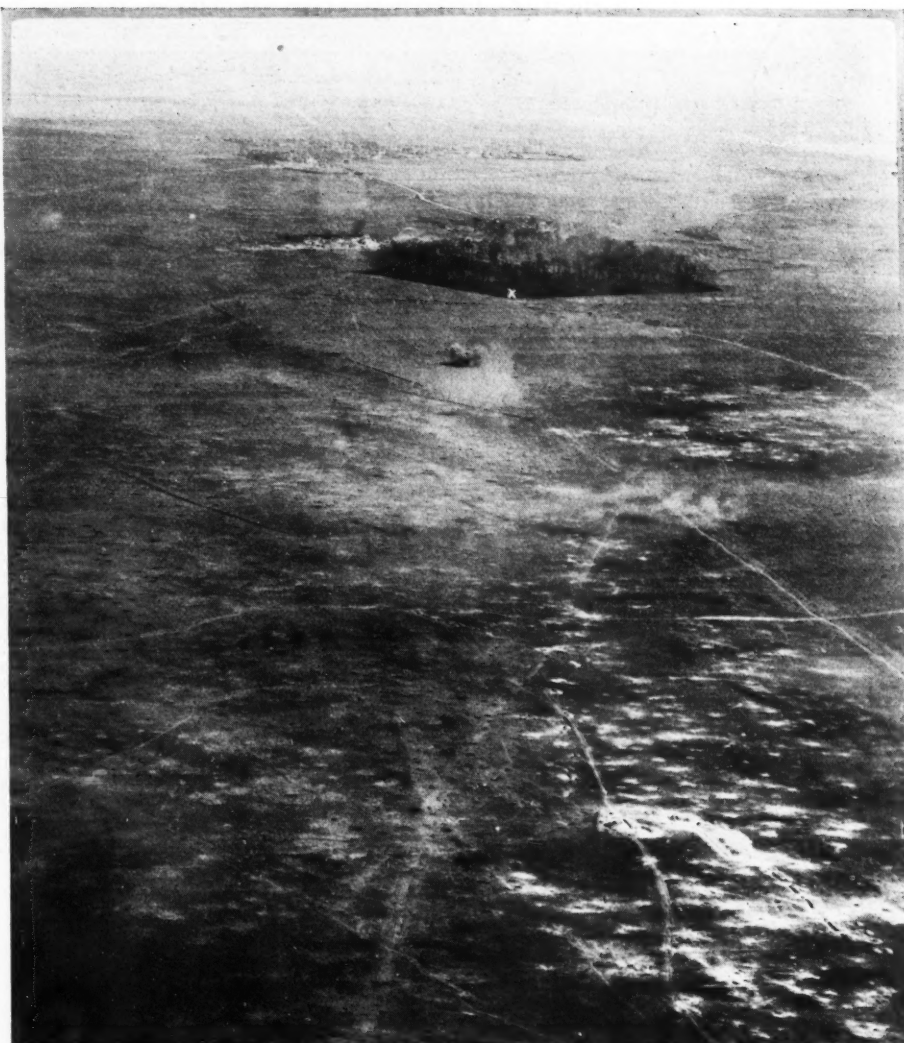
Headlight Laws Over the Border

TORONTO, Ontario, Aug. 2—Only in three provinces of the Dominion of Canada is a law enforced requiring non-glare lenses or deflecting devices for motor car headlights. These provinces are in the Canadian west and are Manitoba, Saskatchewan and Alberta. The law is practically the same in each case, although it is worded differently in each of the three provinces. In Saskatchewan no mention is made of ray deflectors, the regulation in question providing for "dimmed headlights" which must not be dimmed, however, so that the driver of a car cannot see an object 100 ft. down the road or 10 ft. away from the side of a road for the same distance.

Alberta has a standard requirement in that the full rays of a headlight must not shine above 42 in. above the level ground at 75 ft. from the car. No distance is mentioned in the Manitoba law, but there are instructions regarding the approval of various types of non-glare lenses or ray-deflecting devices.

Ontario adopted a non-glare headlight law more than a year ago, but it has never been put into effect because of an official report by the Department of Public Works and Highways in which it was stated that no standard of illegal brilliancy could easily be determined and without a legal limit of light such a law could not be enforced. A peculiar situation therefore prevails in Ontario.

After the legislation was passed by the Ontario legislature, various manufacturers of non-glare lenses or deflectors started advertising campaigns in the province and many owners equipped their cars with the special lenses or dimmers, in anticipation of the enforcement of the law. The latter



Chateau used by Crown Prince Ruprecht of Bavaria under fire of British airplanes. Bombs can be seen landing on the chateau and in front of it. This photograph also shows clearly the German trenches

never came, and now practically no special lenses are being sold in the province. The manufacturers also have stopped advertising their wares. The car owners have been urged to adopt the dimmers or deflectors on their own account for their own safety and the convenience of others, but there seems to be little desire on the part of the owners to take the law into their own hands in this manner.

Another peculiarity in the laws of two of the western provinces is that in both Alberta and Saskatchewan all farm tractors must be licensed and carry number plates similar to those for cars. The charge for a tractor license in Alberta is \$7.50 per year and this amount covers the free inspection of the machine by the provincial government. One reason for the enforcement of this law, it is declared, is to facilitate the prosecution of tractor owners whose machines happen to tear up road surfaces and damage bridges and culverts.

AIRPLANE TOUR PLANNED

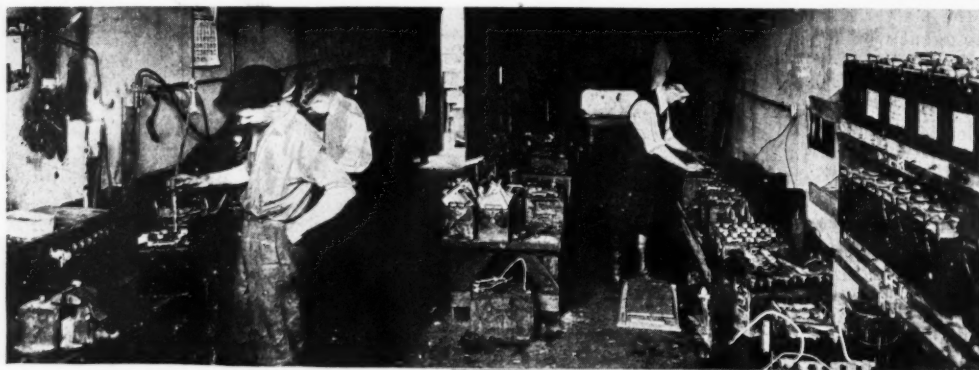
Washington, Aug. 2—Brig.-Gen. Charles F. Lee, commanding the British aviation mission in this country, will make an airplane tour of the middle western states, assisted by Capt. J. J. Hammond, James

Fitz Morris, W. A. Hannay and G. E. Hunter. The tour will be a practical demonstration of aerial fighting. All the officers engaged are distinguished members of the Royal Air Forces and have seen active service. They will start from Indianapolis on or about Aug. 14, and stop at 16 of the principal mid-western cities, making total air flights of 2500 miles. They will show the various air stunts and will point out in public talks the necessity for teaching advanced flying to our aviators.

Airplanes used will include a De Havilland fighting machine and a Bristol fighter, both two-seated planes, and two British Avro two-seated training planes. It is also possible that some of the single-seated Sopwith Camels and S. E. 5's will be available, as these are expected from abroad and will be used if they arrive in time.

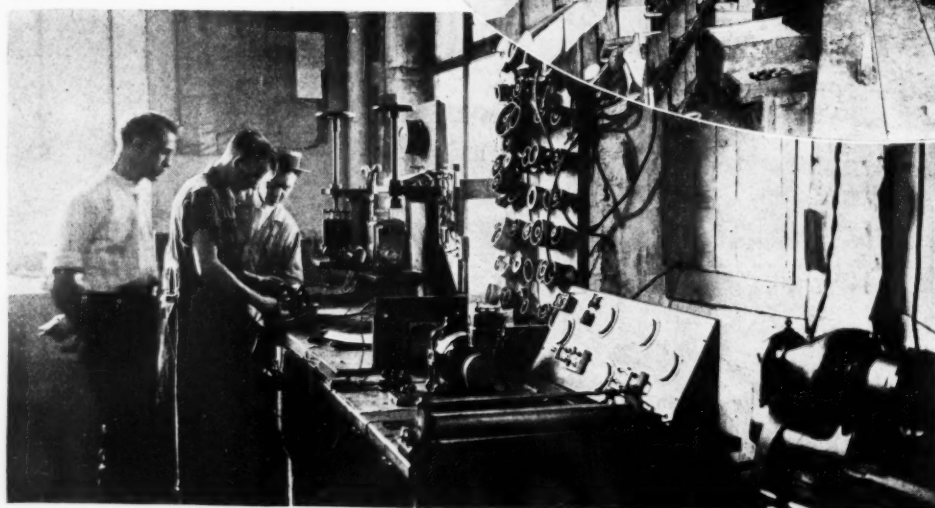
The itinerary will include air flights by at least three machines between Indianapolis, Cincinnati, Dayton, Columbus, Cleveland, Buffalo, Detroit, Toledo, Chicago, Milwaukee, Minneapolis, St. Paul, Des Moines, Omaha, Kansas City and St. Louis, probably in the order mentioned. Flights will be made over cities, the flyers going through aerial battle tactics, etc.

Looking Through the Arthur Jones Service Station



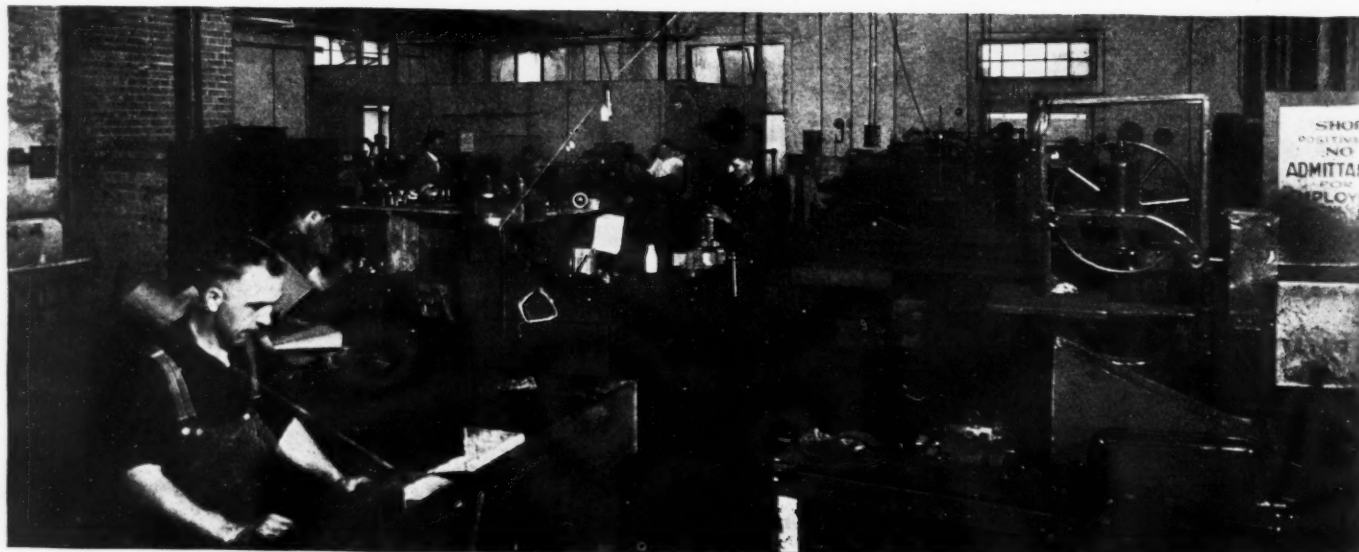
Room for the care
and repair of storage
batteries

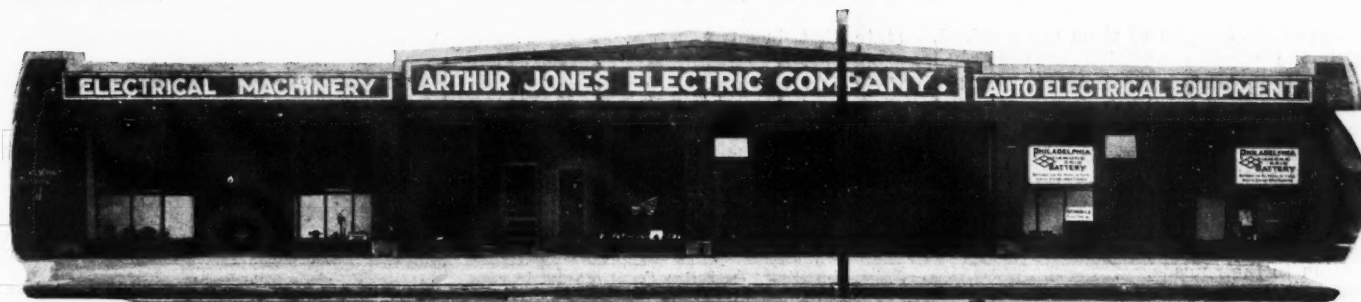
One of the stock-
rooms in which is
contained thousands
or parts, right



Left—In this room every
job is tested before and
after attention

Below—Shop with elec-
trically driven equipment





Plant of the Arthur Jones Electric Co. in Chicago, where the service is exclusively electrical

Service That Is Exclusively Electrical

Personal Attention and Accuracy
Make Repair Station Profitable

ARTHUR JONES sat at the desk in his private office and seemed to be fiddling aimlessly with the two or three telephone receivers standing around. Finally he touched a button and the girl at the telephone board in the front office left her post and came in.

"Why don't you answer my signal?"

"Why, Mr. Jones, I just thought you took the receiver down by mistake."

For a moment he looked at her, while over his face came a shadow of sternness, but he said quietly enough: "Young lady, I don't make mistakes."

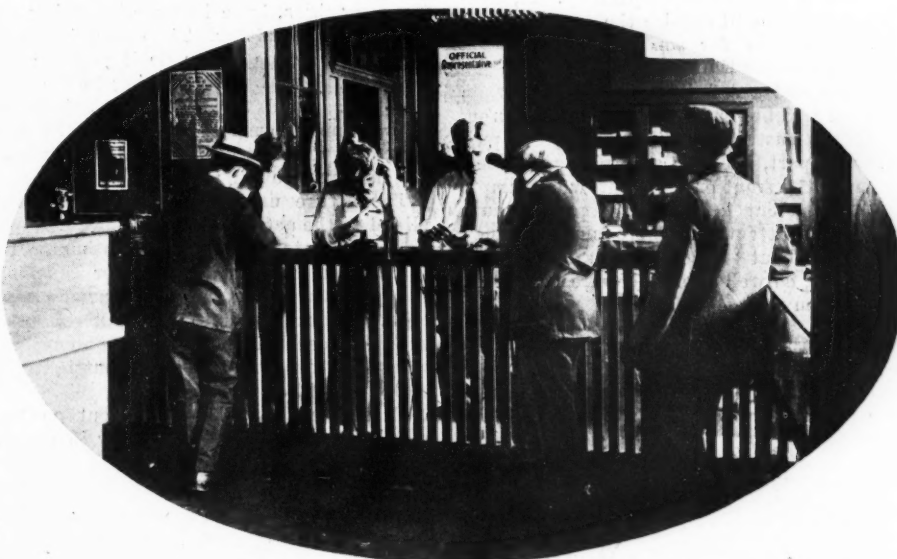
That's it. "I don't make mistakes," is the keynote of the organization which Arthur Jones has built up and upon which rests the responsibility of maintaining the reputation for service possessed by the Arthur Jones Electric Co., Chicago.

Service Rendered

The Arthur Jones Electric Co. renders a kind of service which is unique. It is exclusively electrical and Mr. Jones says there is none other just like it anywhere. The company specializes on the repair of electrical equipment for motor cars and draws custom even from the most distant parts of the country, for the company's slogan, "If it's electrical, we can fix it," has been made good in performance and the knowledge that this is so is widespread.

The company was established in 1903, in a small way, when it appeared doubtful if an exclusive electrical service station could succeed. However, Mr. Jones had an idea and proceeded to embody that idea in the business. He conceived the notion that electrical service of the right kind was bound in the long run to succeed and he intended to prove his theory. It was not long before recognition began to come. First one electrical company after another found it advantageous to place its service exclusively in the hands of the company. The business grew. More and more space was occupied. Department after department was added. In time greatly increased facilities became necessary. Therefore, last December the company moved to its present location, where upward of 18,000 sq. ft. of floor space are occupied.

The company is the exclusive factory representative and service station for the Berling magneto, the K. W. Ignition Co.,



A customer gets immediate attention in the retail sales department



The service station has a capacity of 100 cars

Philbrin ignition, Dyneto Electric Co., Westinghouse Electric and Mfg. Co., Connecticut Telephone and Electric Co., Jesco (Jones) starting and lighting, Eclipse Machine Co., (Bendix drives), Heinze-Springfield starters for Fords, Waltham speedometers, Van Sicklen speedometers, Bran-

ford Ford carbureters and Philadelphia batteries.

The reputation of the company and its standing with the companies it represents are based upon service—prompt, efficient, accurate, dependable, reliable, guaranteed, courteous service. All these adjectives are

deserved, because all of them are required, with the possible addition of the word personal, to characterize the kind of the service rendered by the Arthur Jones company. The personal nature of this service deserves special mention. Mr. Jones began business with the conviction that patrons of a service company appreciate the personal attention of a man who knows what he is doing and who gives his personal attention to their needs.

How this is applied appears when a car is driven into the service station for repair. It is met immediately by L. C. Fevier, superintendent of the plant, who without delay ascertains the nature of the difficulty and at once assigns the work of repair to the mechanic in the employ of the company best qualified to do it.

Should the job happen to be one requiring but little time the patron waits for it in a comfortable waiting room maintained for this purpose. The comfort of woman patrons is looked after especially. If, however, the job will require the car to be left at the station for some time, a careful estimate of the time required to do the job is made and a definite promise as to when the car will be ready is made to the patron.

If the customer desires merely to purchase a part, he finds a retail parts salesroom in the front of the plant, where ample and competent help is at hand to insure immediate attention. There is no hesitancy or delay about the retail sales department. All sales, as well as service, are conducted strictly on the cash basis.

DETROIT USED CAR SALES BRISK

Detroit, Aug. 2—Brisk sales of used cars are reported from all quarters around the Detroit territory. Only very few dealers

state that business is not as good as it should be. Practically all dealers estimate their July business to be from 25 to 33½ per cent better than during the month of June and nearly all of them show marked increases over last year's business. One dealer reports an increase of 100 per cent over last year, while another gives the figure as 25 per cent in advance of a year ago.

During the first twenty-seven days of July, the Simonds Sales Co. reports, it sold ninety-five used cars and ninety-nine new ones—forty-nine of these were "trade-ins." All dealers state that the used car business has a wonderful future. Everybody is making more money than they ever did before. This enables many persons to buy cars who have heretofore been stopped from buying them owing to the fact that they had insufficient funds saved to meet the initial payment.

Liberty loans, while they had a dampening effect on business during the time of the campaigns, have had a stimulating effect on car sales later. The money invested in Liberty bonds has made it possible for many people to buy cars owing to the fact that it assisted them very materially in having enough cash value to make the first payment, which is usually the big obstacle for the average car purchasers.

The future used car business is exemplified in the action of the Thomas J. Doyle Co., distributors of Dodge Brothers cars. It is about to establish another company to be known under the same name, a new organization formed to buy and sell used cars. No cars will be accepted on consignment; all cars will be bought outright for cash and sold on easy terms.

Three men have been sent out on the road to cover the entire country in search

of used cars. A store has been leased and when fully equipped will be one of the best appointed used cars salesrooms in the country. All lines of cars will be handled. The business will open about Sept. 1.

TRACTOR DEMONSTRATIONS

(Concluded from page 19)

A good deal of progress has been made in the last year in inclosing the different tractor parts. The introduction of the live axle design, or what is called the motor car axle type, has helped this movement a good deal. Last year, there was but one live axle design. This year there are several. Wallis was the leader in this movement. These have the advantage of having all parts inclosed and properly protected from the dust.

One of the great objections to the live axle design was that the drive wheels were too small in diameter and that they would not work well on soft soil. This has been entirely disproved. For the time, many manufacturers imagined that any tractor drive wheel less than 60 in. in diameter would not work well on many soils. It has been proved that wheels 48 in., 50 in. and 52 in. give good service. Wheels of smaller diameter than 48 in. have demonstrated how satisfactory they are for general use. It is more a question of the kind of clips or anti-skid cleats that are fitted to the wheels than to the diameter of the wheels.

The majority of the tractors are still too heavy. Some of them weigh 8000 lb., whereas they should not weigh more than half. They could do just as good work if they weighed 3500 lb. Not a few tractor engineers have worked on the assumption that to get a tractor that would pull well, they must have weight. They are slowly learning that the pulling capacity of a machine does not depend on its weight but rather on the symmetry of its design, and the relation of the tractor to the work to be done. The sooner more engineers realize this, the sooner will they cut 1000 or 2000 lb. out of some of their machines, and the better will their machines be because of this. It would be surprising if within one short year, the industry could be revolutionized. There have been great changes made, many more than appear on the surface. There are hundreds of examples where anti-friction bearings are used where plain bearings were used a year ago.

There are scores of cases where forged and cut gears are used where cast gears were in place a year ago. The use of cleaners for the entering air to the carburetor is very general. It is a recognized part of tractor equipment. There are many respects in which tractors can be improved. This applies particularly to many of the newer makes. They are lacking in good steering gears. They are lacking in good standardized front axle designs. Frame designs are generally crude and can be made lighter and stronger. Wheels have been made much lighter in the last year and there are still many tractors where this work can be carried still further.

JORDAN DECLARES DIVIDEND

Cleveland, Ohio, Aug. 6—The Jordan Motor Car Co. declared the first dividend Aug. 1. This was 7 per cent on the preferred stock.



The motorist is proving an ever-present aid in time of motoring need for the sailors and soldiers these days, and here is the sticker many of the Chicago cars carry on their windshields to let men in service know they can ride

Women's Motor Corps United

Six Thousand Now in Red Cross Service Throughout Nation

CONTRARY to the general impression created throughout the country, the American Red Cross Motor Corps Service will not carry the official telegrams containing information regarding overseas casualties to the homes of the relatives of the killed or wounded. Instead all casualty information will be forwarded by the War Department either by wire or letter direct to some relative of the soldier or sailor.

If the chapters request information regarding a soldier or sailor the Bureau of Communication will obtain from the chapter the name of the nearest relative of the soldier or sailor and advise the chapter that the relative will be notified direct as soon as the information can be obtained.

However, this is by no means to indicate that the motor service of the Red Cross, newly organized and augmented, will not have a great and important work to do. More than 6000 women now are included in the personnel of the Red Cross Motor Corps Service. A conference was held in Washington not long ago at the call of the director of the Bureau of Motor Corps Service, and the motor service of the women in six of the principal cities of the country, which previously had been independent in organization, was amalgamated with the Red Cross corps.

This has resulted in corps able to meet the local and inter-local demands for transportation throughout the country on a nationalized basis. The organizations which have taken this step are:

The Motor Messenger Service, Philadelphia, Pa.

The National Service League Motor Corps, Atlanta, Ga.

The National Service League Motor Corps, New York and Buffalo, N. Y.

Woman drivers from distant cities come to the Ford plant at Detroit daily to drive away ambulances. They represent various motor corps



A driver for the Evanston Red Cross branch. The truck is a Maxwell lent by Harry Newman

The Emergency Motor Corps, New Orleans, La.

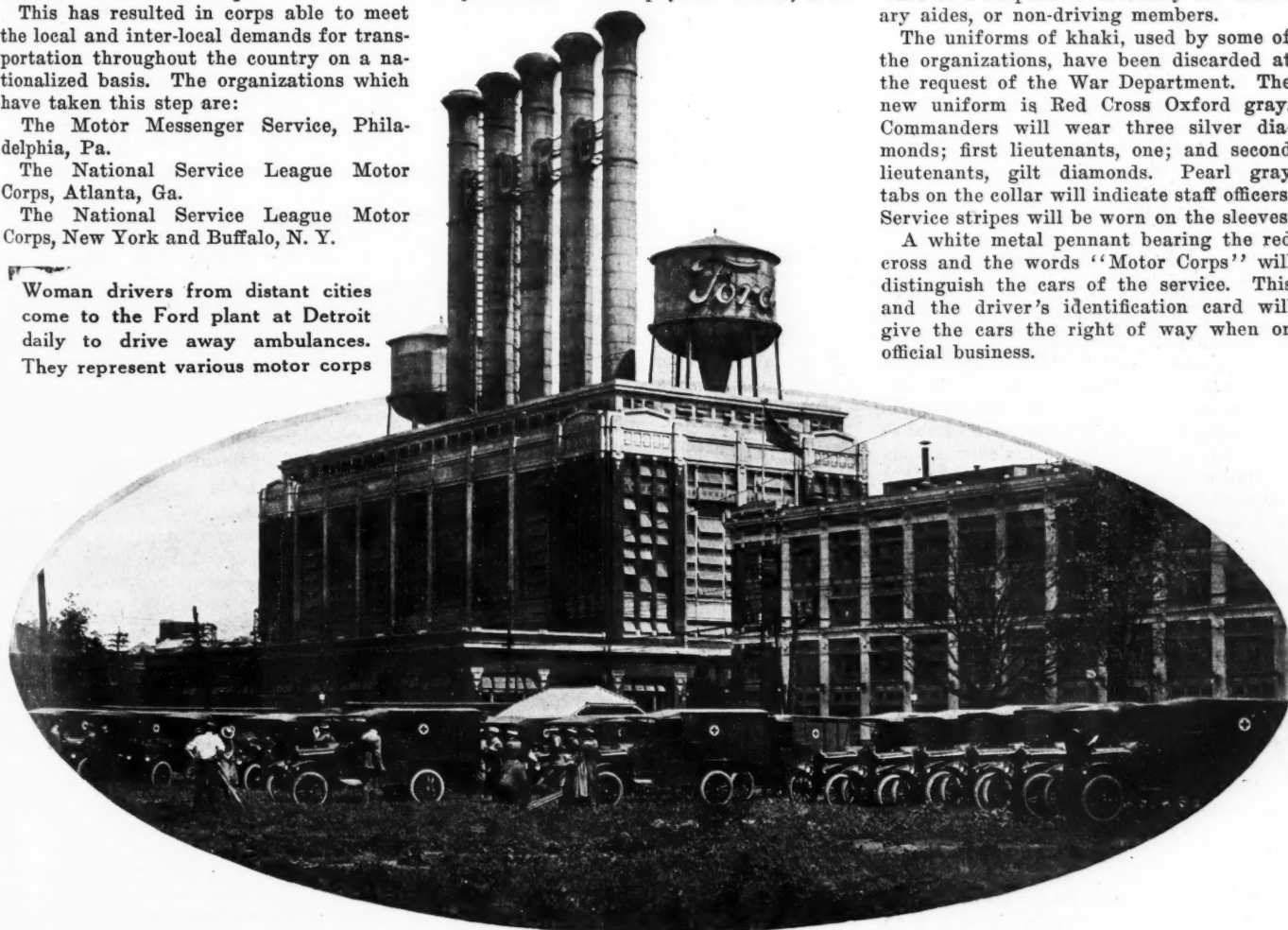
The Emergency Drivers, Chicago.

The independent organizations added 600 members to the motor corps. Rules and requirements have been standardized. The requirements include physical fitness, driv-

ing expertness, mechanical knowledge, independence in road accidents and military drill for members of the transportation division. Ambulance drivers in addition must have first-aid and 'stretcher drill. Twelve days' experience in the accident ward of a hospital is necessary for auxiliary aides, or non-driving members.

The uniforms of khaki, used by some of the organizations, have been discarded at the request of the War Department. The new uniform is Red Cross Oxford gray. Commanders will wear three silver diamonds; first lieutenants, one; and second lieutenants, gilt diamonds. Pearl gray tabs on the collar will indicate staff officers. Service stripes will be worn on the sleeves.

A white metal pennant bearing the red cross and the words "Motor Corps" will distinguish the cars of the service. This and the driver's identification card will give the cars the right of way when on official business.



Farm Equipment for Tractor Users

Specially Designed Machines Brought Out by
Trade Alliances of Manufacturers



Here is a binder which cuts 10 ft. and is designed for use with tractors

POWER operative equipment for the farm, consisting of machines of sturdier construction and with larger capacity than horse-drawn equipment, specially designed to be used in connection with tractors and constructed to withstand the terrific strains of power farming, is making its appearance. In large measure this result has been brought about by a manifest tendency of the manufacturers of tractors and the manufacturers of farm-operative equipment to pair off and to build tractors and engine equipment designed to be sold and used as a unit.

This tendency has manifested itself openly during the last year and is of great significance. The motives behind it probably are two-fold. The first is the idea that a higher efficiency for both tractor and equipment will be attained where the two are designed specially for each other and used as a unit, since better co-ordination between power and implement will be secured. The second, and perhaps with some of the manufacturers the more powerful motive of the two, is a desire to establish a trade relationship between a certain tractor and certain lines of equipment, so that the manufacturers of the equipment shall be assured of their share in a trade which is certain to assume large proportions.

Ford Was First

The first tractor manufacturer who openly announced a policy of recommending equipment was Henry Ford. A special plow for use with the Fordson tractor was designed and built by the Oliver Chilled Plow Co. and a special engine tandem disk harrow by the Roderick-Lean Mfg. Co. As far as it was possible to do so, acting probably on instructions from the Fordson organization, the distributors of the Fordson tractor have made it conditional that the purchaser of a tractor shall buy also an Oliver plow and, where it could be done, a Lean harrow. It is announced also as the settled policy of the Fordson distributors not to handle any other equipment than

that which receives first the sanction and approval of Mr. Ford. This has additional interest from the fact that other power equipment of various kinds is being developed for use with the Fordson and will be put upon the market under the same conditions as were the plow and the harrow.

But Henry Ford has not been alone in this. The Moline Plow Co. has made the purchase of a Moline engine gang plow a condition upon the purchase of a Moline Universal tractor, and the peculiarity of the Moline Universal hitch is such that other Moline equipment almost is essential for successful use with the Universal tractor. As the Moline plow company makes a complete line of equipment, this circumstance has an important bearing upon their trade and upon the trade of their agents.

This pairing off of tractor and equipment, whether by recommendation because of special design or whether necessitated by the peculiarities of construction, constituted an advantage in the sale of equipment which other manufacturers were prompt to recognize. The result has been that several trade alliances have been announced between manufacturers of tractors and manufacturers of equipment, or the manufacturers of equipment have acquired a tractor which might carry the equipment. A case in point was the purchase recently by General Motors of an interest in the Janesville Machine Co., with the announcement that a special line of Janesville engine equipment would be built for use with the Samson tractor and that the lines would be sold as a unit. Very recently, too, the La Crosse Tractor Co. has announced that it has arranged with the La Crosse Plow Co. for a line of Happy Farmer equipment which will be sold as such and which is designed especially for use with the Happy Farmer tractor.

The recent purchase of the Waterloo Gas Engine Co. by Deere & Co. brings a new coalition of tractor and power equipment

into the field, for it hardly can be doubted that Deere & Co. will foster the sale of the company's own equipment when selling a Waterloo Boy tractor.

A similar condition exists with the Rock Island Plow Co., which also builds and sells the Heider tractor; the Emerson-Brantingham Co., with the E-B tractor and the Emerson line of equipment.

There are still other instances of trade alliances more or less close between manufacturers of tractors and of power equipment, which, while not so conclusive as those mentioned perhaps, nevertheless indicate the manifest tendency of the trade to pair off in this way. Furthermore, it may be considered likely that as far as it is possible to go under the law and with due regard to consistency in trade policies, efforts will be made all along the line of these alliances to sell tractors and recommended lines of equipment as units. This cannot be prescribed absolutely, of course, but it will be done to the limit of possibility.

This tendency has great significance for the dealer. Particularly is this the case in view of the parallel tendency of so many tractor manufacturers to look to the motor car trade for desirable agents. Selling tractor and equipment lines together, the result will be, manifestly, that motor car dealers will be put into the farm-operative equipment business as well, since they will be expected to sell the recommended equipment with the tractor. In fact, motor car dealers who have been in the tractor business during the last year or so, but who heretofore have done little or nothing in the equipment line, now are signing contracts for the coming year which cover equipment and tractors. This, too, will be the thing which new motor car dealers will undertake as they get into the tractor business. In effect it means the final and permanent establishment of the automotive dealer in the farm-operative equipment business, and there are those who prophesy that the end will be a complete revolution in the farm implement business.

New Type Inevitable

However that may be as far as the dealer and the implement business are concerned, the development of a new type of power-operative equipment was inevitable. It did not take long after the tractor made its appearance to demonstrate that existing types of farm operative equipment would not do. Every implement for the farm had been designed when the horse was the power unit, and both his capacities and limitations had been allowed for. Every piece of machinery was designed to conform to slow-speed conditions and the relatively light but flexible power of the horse. Furthermore, the tendency for years had been to simplify design and lighten construction, at the same time refining the mechanical principles involved.

When the tractor began to take the place

of the horse there came upon the farm a power unit which hardly showed any limitations within the scope of farm power requirements. The tractor, as far as the farm is concerned, had practically limitless power and endless endurance. In addition, its power was absolute, not flexible like that of the horse. When used with equipment designed along the old lines it was demonstrated speedily that the old equipment could not stand the strain. It went to pieces rapidly. Nor did it have the capacity for work demanded by the tractor.

This first was discovered with plows, and naturally so. The tractor was considered originally as a plowing machine primarily, and many still so regard it. This necessitated the evolution of an entirely new type of plow, and the engine gang resulted. The engine gang is immensely heavier than its horse-drawn prototype and it will withstand stress and strains which would wreck the old-style plow in a short time. Engine gang plows now have been in use for so long that their principles of design and construction generally are known and the ways in which they depart from the horse-drawn type are well understood.

Halted for a Time

Development of power-operative equipment halted for a time with the engine plow. This delay was due in part to the uncertainty in the minds of equipment manufacturers regarding the extent to which the tractor would be used upon the farm. Its extreme versatility and adaptability were not recognized either by the manufacturer or by the actual tractor owner. Tractors were used largely for plowing, and experience with other equipment came slowly. Another cause for delay in designing special power equipment came from the fact that but few of the tractor manufacturers made operative equipment, and but few of the manufacturers of operative equipment made tractors. The tractor manufacturer practically had to demonstrate the need for special engine machinery before the equipment manufacturer



Ten-foot mower for use with tractors, a Moline and the largest ever built

would undertake the construction of it.

Gradually, however, it dawned upon both the tractor manufacturer and the equipment manufacturer that a new era had come in agriculture. This meant that what amounts almost to a complete revolution in implement construction was needed. Once this conception gained general currency advance was made rapidly. That no more special engine equipment is yet upon the market is due to the fact that recognition of the need has been acquired recently. But things are moving now. The engine tandem disk harrow followed the plow, and now are coming other tillage and harvesting machines. Announcement just has been made that a binder and a mower, both cutting a swath of 10 ft., the largest machines of the kind ever built and constructed especially for use with the tractor, are ready for distribution. Development is under way with other implements for tillage operations, seeding operations and harvesting. Soon there will be almost a complete new line of farm-operative equipment designed

specially to meet the conditions of power farming and co-ordinated with the tractor as the power unit. Many of these will have made their appearance by the coming of the next year's trade.

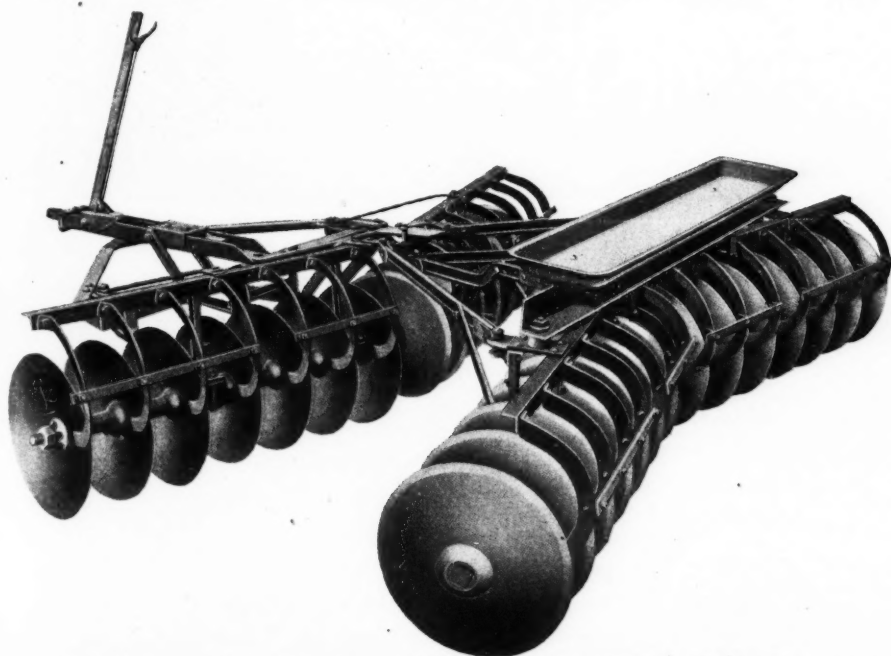
This, coupled with the fact of combining tractor and implements as a recommended unit for use on the farm, will have a profound bearing upon the dealer and his trade. Just to what extent present tendencies will go, and just what significance they will have for the dealer, it is impossible to say at this time, but there is enough and more in the situation to make the dealer who intends to succeed in the tractor business think hard.

KANSAS ENCOURAGES TRUCKING

Topeka, Kan., Aug. 3—A Kansas transport committee, operating under the Council of National Defense, has been organized here. W. C. Markham, secretary of the Kansas highway commission, was named chairman and will be in active charge of the campaign to increase the transportation of small lots of merchandise by motor truck to relieve the congestion of the railroads. The state has been divided into five districts with a chairman in charge of each district. The first district is under H. S. Putney, Topeka; the second district, W. F. Allen, Chanute; third district, John W. House, Wichita; fourth, Charles Lamer, Salina; and fifth, William Lutt, Concordia. In each district will be an executive committee of five members to work with the chairman. The plan is to encourage the farmer to make the return loads for the trucks, after they deliver the merchandise to the merchants of the towns they pass through.

CAN PRODUCE 300 TRACTORS DAILY

Dearborn, Mich., Aug. 2—The new Fordson tractor plant to be built in Hamilton, Ohio, is expected to be in production within ninety days and will employ between 500 and 1000 men. The plant will manufacture and assemble tractors for Ohio, Indiana, Illinois and territory south of the Ohio river. The water power that will be developed at this plant will be sufficient to manufacture 300 tractors a day.



Engine tandem disk harrow designed by Roderick Lean Mfg. Co.

The Owner Buys the Tire and then The Dealer Keeps It Up

For the benefit of patrons the concern makes daily deliveries and pick-ups of repair work. The repair department is complete in every detail and essential of modern tire repair and rebuilding.

The salesmen are instructed to notice cars on the street with the wheels out of line or with badly worn tires and to get in touch with the owner and inform him of the service which the company renders. Needless to say, this method brings vast returns on the proper side of the ledger.

The serial numbers of all tires sold are kept both serially and alphabetically as a protection against theft and as an aid to identification in case they should be stolen.

The main sales argument is that the tires are of a well known make and that it costs no more to buy of the Great Lakes Tire Service and obtain this service than it does to buy of the ordinary dealer and either get no service or comparatively little.

The Great Lakes Tire Service maintains a fleet of small cars, motorcycles and a heavy-duty truck to care for road troubles with the tires

A glance at the wares of the Great Lakes Tire Service and the truck that answers calls from users of its truck tires



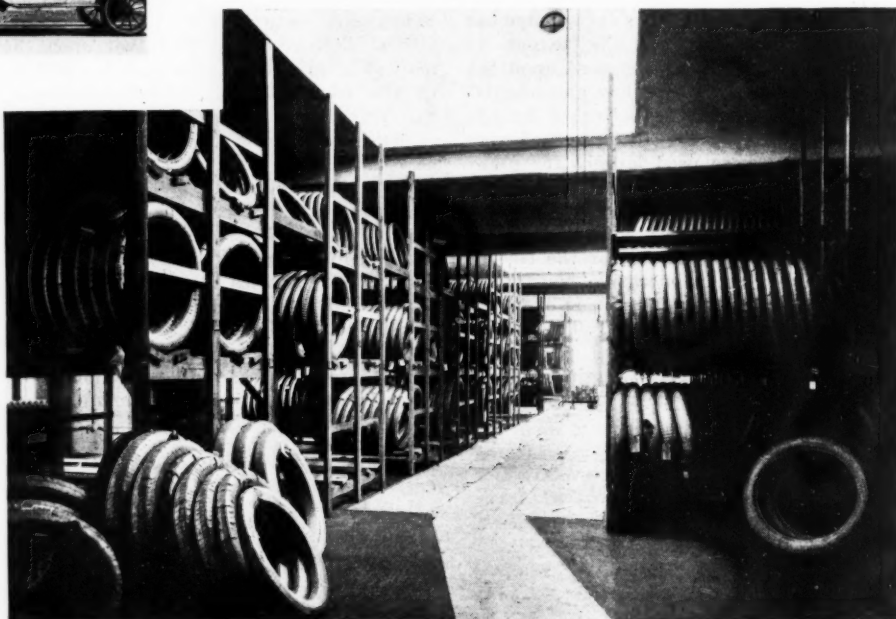
IN the present day of keen competition the wideawake dealer must resort to new and novel methods not only to secure business but to retain it as well. The Great Lakes Tire Service, Inc., Chicago, has instituted a tire service as an aid to the merchandising which should prove a business getter in a large way.

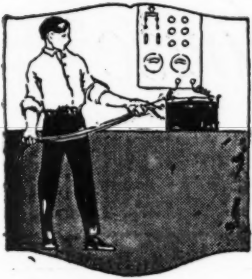
The service is one which can in no way be bought but which is obtained by becoming a patron of the company and which lasts during the life of the tire, tube or repairing sold or cared for.

Deals in One Make

The concern deals in only new tires and in only one make, carrying a complete stock of the various sizes for both passenger cars and trucks with pneumatic equipment. In Chicago the main store is located centrally and the concern maintain branches in the outlying districts, where patrons can obtain the same service as at the main office. The plan is to sell a tire and then take care of it during its life. It not only cares for it at any of its stores but is no farther away from the customer than he is from a telephone. To take care of telephone calls the Great Lakes Tire Service maintains a fleet of small cars and motorcycles equipped with all the known appliances for rapid road repair. To care for the users of heavy truck tires they have in service a fast heavy-duty truck which is capable of immediately answering and caring for any road trouble encountered by any of the users of truck tires.

In connection with the stores a service lot is maintained where the patron can obtain free air, tire and tube service and have the alignment of the wheels inspected without cost. The plan is to keep open house as many of the 24 hr. of the day as the ruling on labor will permit.





Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the 106th installment of a weekly series of articles begun in MOTOR AGE, issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York.

A thorough explanation of the fundamentals of electric circuits preceded descriptions of the general types of starting, lighting and ignition apparatus, signalling devices, magnetic transmissions, etc. This is being followed by the installation, care and repair of individual systems, beginning with the special equipment for Fords.

Part CVI—Dixie Magneto for Fords—Concluded

REPLACE the radiator and connections. Refill the radiator, examine the spark plugs and set the spark plug points .20 to .25 inch, using the gage on the screwdriver supplied with the outfit for that purpose.

With the switch lever on the magneto position, and the spark lever about a third advanced, crank with a quick snap over the compression. If properly timed the engine should run.

Care of the Dixie

The bearings of the magneto are provided with oil cups, and a few drops of light oil every 1,000 miles are sufficient. The

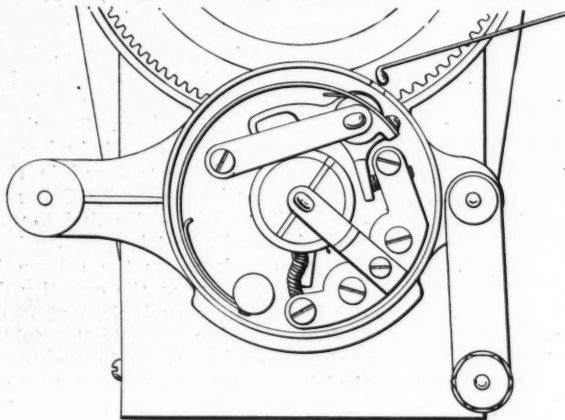


Fig. 580—Interior view of breaker box on Dixie magneto, with cover removed

breaker lever should be lubricated every 1,000 miles with a drop of light oil, applied with a toothpick. The proper distance between the platinum points when separated should not exceed .020 or 1/50 inch. A gage of the proper size is attached to the screwdriver furnished with the Dixie. The platinum contacts should be kept clean and properly adjusted. Should the contacts become pitted, a fine file should be used to smooth them to permit them to come into perfect contact. A view of the breaker with the cover removed is shown in Fig. 580.

The distributor block should be removed occasionally and inspected for an accumulation of carbon dust. The face of the distributor disk should be cleaned with a cloth moistened with gasoline and then wiped dry with a clean cloth. Do not pull out the carbon brushes in the distributor because you think there is not enough tension on the small brass springs.

To obtain the most efficient results with the Dixie magneto the normal setting of the spark plug points should not exceed .025 inch and it is advisable to have the gap just right before a spark plug is inserted. The spark plug electrodes may be set easily by the gage attached to the screwdriver furnished with the Dixie magneto. The setting of the spark plug points is an important function which usually is overlooked, with the result that the magneto is blamed when it is not at fault.

Faulty ignition may be due to various causes, and a careful inspection should be made to ascertain whether the spark plugs or magneto require attention.

A spark plug may be short-circuited by a piece of carbon between the electrodes and body of the plug. Removing the carbon particles will remedy this at once.

LESS MINERAL OILS EXPORTED

Washington, Aug. 2—Exports of mineral oils for June, 1918, amounted to 224,269,286 gal., valued at \$28,400,780, as compared with 264,737,322 gal., valued at \$27,342,036, for June, 1917. The total mineral oils exported in the twelve months ending June, 1918, was 2,677,037,650 gal., valued at \$298,144,927, as compared with 2,748,328,485 gal., valued at \$230,968,940, for the twelve months ending June, 1917.

Following is the exports of crude mineral oil, lubricating oil, gasoline, naphtha, etc., residuum, fuel oil, etc.:

Crude mineral oil,				
Gallons.	23,697,244	22,044,732	183,672,778	177,748,832
Dollars.	1,346,301	1,257,825	9,107,519	7,309,990
Lubricating oil,				
Gallons.	23,990,930	27,970,927	269,667,145	271,032,751
Dollars.	6,468,097	5,561,479	66,146,827	48,665,984
Gasoline, naphtha, etc.,				
Gallons.	48,387,426	53,305,921	468,205,346	425,717,912
Dollars.	11,904,052	11,903,366	113,855,712	87,990,807
Residuum, fuel oil, etc.,				
Gallons.	95,654,193	94,034,386	1,226,686,880	1,039,859,973
Dollars.	5,278,217	3,633,178	61,546,444	32,359,782

VIRGINIA ASKS NEW ROADS

Washington, Aug. 2—Virginia citizens and congressmen urged Major-General Goethals this week to repair the roads of Virginia damaged by the increased traffic of Army trucks, through Government appropriation.

In all eighty-five per cent of the traffic over the Virginia roads, it was said, is by Government vehicles. The delegation agreed to submit a statement by which some policy may be worked out for Government maintenance of the highways in Virginia.

The Readers' Clearing House

Conducted by B. M. Ikert

How to Determine Metric Equivalents

CONVERSION OF KILOMETERS INTO STATUTE MILES										
Kilom.	0	1	2	3	4	5	6	7	8	9
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
0	0.0000	0.6214	1.2427	1.8641	2.4855	3.1069	3.7282	4.3497	4.9711	5.5924
10	6.2138	6.8352	7.4565	8.0780	8.6994	9.3208	9.9421	10.562	11.185	11.805
20	12.427	13.049	13.670	14.292	14.913	15.534	16.156	16.776	17.399	18.019
30	18.641	19.263	19.884	20.506	21.127	21.748	22.370	22.990	23.613	24.233
40	24.855	25.477	26.098	26.720	27.341	27.962	28.584	29.204	29.827	30.447
50	31.069	31.690	32.311	32.933	33.554	34.175	34.797	35.417	36.040	36.660
60	37.282	37.904	38.525	39.147	39.768	40.389	41.011	41.631	42.254	42.874
70	43.497	44.118	44.739	45.361	45.982	46.603	47.225	47.845	48.468	49.088
80	49.711	50.332	50.953	51.575	52.196	52.817	53.439	54.059	54.682	55.302
90	55.924	56.545	57.166	57.788	58.409	59.030	59.652	60.272	60.895	61.515
100	62.138	62.759	63.380	64.002	64.623	65.244	65.866	66.486	67.109	67.729

CONVERSION OF CUBIC CENTIMETERS INTO CUBIC INCHES										
Cu. cm.	0	1	2	3	4	5	6	7	8	9
	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.	Cu. in.
0	0.0000	0.0610	0.1221	0.1831	0.2441	0.3051	0.3661	0.4272	0.4882	0.5492
10	0.6102	0.6712	0.7323	0.7933	0.8543	0.9153	0.9763	1.0374	1.0984	1.1594
20	1.2205	1.2815	1.3426	1.4036	1.4646	1.5256	1.5866	1.6477	1.7087	1.7697
30	1.8308	1.8918	1.9529	2.0139	2.0749	2.1359	2.1969	2.2580	2.3190	2.3800
40	2.4410	2.5020	2.5631	2.6241	2.6851	2.7461	2.8071	2.8682	2.9292	2.9902
50	3.0513	3.1123	3.1734	3.2344	3.2954	3.3564	3.4174	3.4785	3.5395	3.6005
60	3.6615	3.7225	3.7836	3.8446	3.9056	3.9666	4.0276	4.0887	4.1497	4.2107
70	4.2718	4.3328	4.3939	4.4549	4.5159	4.5769	4.6379	4.6990	4.7600	4.8210
80	4.8820	4.9430	5.0041	5.0651	5.1261	5.1871	5.2481	5.3092	5.3702	5.4312
90	5.4923	5.5533	5.6144	5.6754	5.7364	5.7974	5.8584	5.9195	5.9805	6.0415
100	6.1025	6.1635	6.2246	6.2856	6.3466	6.4076	6.4686	6.5297	6.5907	6.6517

CONVERSION OF LITERS INTO U. S. GALLONS										
Liters	0	1	2	3	4	5	6	7	8	9
	Gal.	Gal.	Gal.	Gal.	Gal.	Gal.	Gal.	Gal.	Gal.	Gal.
0	0.0000	0.2642	0.5284	0.7925	1.0567	1.3209	1.5851	1.8492	2.1134	2.3776
10	2.6418	2.9060	3.1702	3.4343	3.6985	3.9627	4.2269	4.4910	4.7552	5.0194
20	5.2836	5.5478	5.8120	6.0761	6.3403	6.6045	6.8687	7.1328	7.3970	7.6612
30	7.9254	8.1896	8.4538	8.7179	8.9821	9.2463	9.5105	9.7746	10.0388	10.3030
40	10.567	10.831	11.095	11.360	11.624	11.888	12.152	12.416	12.680	12.945
50	13.209	13.473	13.737	14.002	14.266	14.530	14.794	15.058	15.322	15.587
60	15.851	16.115	16.379	16.644	16.908	17.172	17.436	17.700	17.964	18.229
70	18.492	18.756	19.020	19.284	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.191	22.455	22.719	22.983	23.247	23.512
90	23.776	24.040	24.304	24.568	24.832	25.097	25.361	25.625	25.889	26.154
100	26.418	26.682	26.946	27.210	27.475	27.739	28.003	28.267	28.531	28.796

CONVERSION OF KILOGRAMS INTO POUNDS										
Kilograms	0	1	2	3	4	5	6	7	8	9
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
0	0.000	2.205	4.410	6.615	8.820	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.67	30.87	33.07	35.28	37.48	39.69	41.89
20	44.10	46.30	48.51	50.72	52.92	55.12	57.33	59.53	61.74	63.94
30	66.15	68.35	70.56	72.77	74.97	77.17	79.38	81.58	83.79	85.99
40	88.20	90.40	92.61	94.82	97.02	99.22	101.4	103.6	105.8	108.0
50	110.2	112.5	114.6	116.8	119.0	121.2	123.4	125.6	127.8	130.0
60	132.3	134.5	136.7	138.9	141.1	143.3	145.5	147.7	149.9	152.1
70	154.3	156.5	158.7	160.9	163.1	165.3	167.5	169.7	171.9	174.1
80	176.4	178.6	180.8	183.0	185.2	187.4	189.6	191.8	194.0	196.2
90	198.4	200.6	202.8	205.0	207.2	209.4	211.6	213.8	216.0	218.2
100	220.5	222.7	224.9	227.1	229.3	231.5	233.7	235.9	238.1	240.3

CYLINDER capacities or piston displacements usually are stated in cubic inches in America but in cubic centimeters in Europe. Roughly speaking, a cubic centimeter is about $\frac{1}{16}$ cu. in. In exact terms there are 16.383 cu. cm. in 1 cu. in., so that to change the metric measurement of capacity from cubic centimeters into cubic inches, it is necessary only to divide by 16.383. If, as is sometimes the case, the capacity is stated in cubic millimeters, it may be changed to cubic inches by dividing by 16383.0, since there are 1000 cu. mm. in a cubic centimeter.

Another measurement of capacity with which we often come in contact in reading of European war motoring events is the liter, used in the same way as our gallon. A liter is equivalent to about $\frac{1}{4}$ gal. 0.2642 gal. exactly. Consequently to change liters to gallons it is necessary to multiply the number of liters by 0.2642. To change liters to cubic inches, multiply by 61, and to change to cubic feet, by 0.035.

Metric Weights

The metric measurement of weights corresponding to the English pound is the kilogram and equals 2.2 lb. Therefore, to change kilograms to pounds it is necessary only to multiply by 2.2. To convert pounds to the metric equivalent divide the number of pounds by 2.2, or multiply it by 0.454, which will give the equivalent in kilograms.

The most usual measurement of length, aside from the millimeter, is the kilometer. The kilometer corresponds to the English mile but it is only a little over half as big as a mile and is equal to 0.62 English statute mile, or 3280.7 ft. The conversion of kilometers to miles means simply

COMMON METRIC CONVERSIONS

MEASURES OF LENGTH

Millimeters $\times .03927$ = inches
 Millimeters $\div 25.4$ = inches
 Centimeters $\times .3937$ = inches
 Centimeters $\div 2.54$ = inches
 Meters $\times 39.37$ = inches
 Meters $\times 3.281$ = feet
 Kilometers $\times .621$ = miles
 Kilometers $\times 3280.7$ = feet

MEASURES OF AREA

Square millimeters $\times .00155$ = square inches
 Square millimeters $\div 645.1$ = square inches
 Square centimeters $\times .155$ = square inches
 Square centimeters $\div 6.451$ = square inches
 Square meters $\times 10.764$ = square feet

MEASURES OF CAPACITY

Cubic centimeters $\div 16.383$ = cubic inches
 Cubic meters $\times 35.315$ = cubic feet
 Cubic meters $\times 264.2$ = gallons (231 cubic inches)
 Liters $\times 61.022$ = cubic inches
 Liters $\times .2642$ = gallons (231 cubic inches)
 Liters $\div 3.78$ = gallons (231 cubic inches)
 Liters $\div 28.316$ = cubic feet

MEASURES OF WEIGHT

Grammes $\div 28.35$ = ounces avoirdupois
 Kilograms $\times 2.2046$ = pounds
 Kilograms $\times 35.3$ = ounces avoirdupois
 Kilograms $\div 1102.3$ = tons (2,000 pounds)

MISCELLANEOUS MEASURES

Kilowatts $\times 1.34$ = horsepower
 Watts $\div 746$ = horsepower
 Calorie $\times 3.968$ = B. T. U.
 Cheval vapeur $\times .9863$ = horsepower

COMPOUND MEASURES

Meter per second = 196.86 feet per minute
 Grammes per cubic centimeter $\div 27.7$ = pounds per cubic inch
 Kilograms per square millimeter $\times 1422.3$ = pounds per square inch
 Kilograms per square centimeter $\times 14.223$ = pounds per square inch

to multiply the number of kilometers by 0.62.

The tables shown here give the equivalent English measurement from 1 to 109

of four of the most usual metric quantities. To use these tables it will be found that the metric quantity is given in the first column while the other ten columns give the English equivalents. Thus in the table showing the conversion of kilometers into English statute miles, the equivalent of 20 km. will be found in the second column under Miles 0, and opposite 20 in the first column under kilometers. That is, 20 km. from the table equals 12.427 miles. In the same way 21 km. are found in the third column opposite 20 under Miles 1, and equals 13.049 miles. To find the English equivalents of a metric quantity it is necessary to look under the column headed by the last figure of the quantity desired. For instance, the equivalent of 79 cu. cm. in cubic inches is found in the eighth horizontal line opposite 70 in the tenth vertical line under 9 and equals 4.8210 cu. in.

In the first line of the second column of the table No. 1 and opposite 0 is given the equivalent of 1 in the metric system. For instance, the exact equivalent of 1 km. is seen to be 2.205 lb. This method of tabulation may seem confusing at first glance, but is very simple when tried out and has the merit of permitting a complete table to be given.

Compound Quantities

In addition to the simple metric quantities which have been given there will be encountered a number of compound quantities which can all be converted into English compound quantities quite readily. For instance, to change kilograms per square millimeters into pounds per square inch it is only necessary to multiply the kilograms by 2.2046, which will give pounds per square millimeter. Multiply by 645.1, the number of square millimeters per inch.

This will give the equivalent of pounds per square inch. This can be done more quickly by taking the product of 2.2046 and 645.1, or 1422.3, which will convert the metric into equivalent English unit for pressure directly. That is, kilograms per square millimeter multiplied by 1422.3 equals pounds per square inch.

Engines

Exhaust and Inlet Cams

Q—On the camshaft there are four cams with a sharp point and four with a round top. Which is the exhaust and inlet?

2—Can horsepower be figured by the work of a man when riding a bicycle?—P. Asquin, Chicago.

1—Those with the sharp point are the inlet. Exhaust cams usually have longer faces than inlets, because the exhaust valve remains open longer.

2—Yes, but as there is no set formula for determining it your only method of finding it would be to attach the bicycle to a recording instrument or to a light block.

Marine Air Compressor

Q—Why will not a marine engine compress air? It has good compression and will put 85 lb. of air in the air tank and no more.—S. V. Gananny, Pleasant Hill, Ill.

We presume that what you refer to is an air pump connected to a marine engine. It may be that this air pump is designed to deliver only 85 lb. of air. The maximum pressure that an air pump will deliver depends upon the clearance space in the cylinder. However, if the air pump is designed to deliver a higher pressure, then the trouble must be due to a leak or to improper action of the valves.

Engine Speed and Spark

Q—Does an engine require a hotter spark at high speed than it does at low speed to fire the gasoline properly, that is, would the spark be advanced and retarded properly?

2—Why could not one improve the average standard high-tension magneto for starting by having the armature in its most efficient position at the point when the lever is in retarded position and for advance spark depend on the extra speed of magneto and engine to increase strength of spark?

3—Is there any difference between plates and separators of starting battery and plates and separators of lighting battery, both of same make capacity and voltage? If so, what is the difference in detail? If not, why could not a lighting battery be used for starting?

4—When a storage battery becomes frozen or slightly frozen, what chemical changes take place in the plates to cause the plates to become ruined? Is there any way of reviving them?—B. Dresser, Homedale, Idaho.

1—An engine does not require a better spark at high speed than it does at low speed to fire properly; in fact, the reverse is the case, as at low speed the mixture usually is poorly proportioned and is difficult to ignite.

2—The best spark is produced when the armature circuit is interrupted while the maximum voltage is induced in the armature. Whether this should be at high speed or at low speed is a matter of opinion. Of course the timing range which gives a sufficiently powerful spark to cause ignition should correspond to the usual working range of the engine.

3—The plates for the starting battery usually are made thinner than those of a battery intended for lighting only, and sometimes ingredients are incorporated in the active material to make it extra porous. The reason for this is that the starting battery has to give a very large current, and to do this it must be possible for the

To assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, MOTOR AGE segregates inquiries into divisions of allied nature. Questions pertaining to engines are answered under that head, and so on.

METRIC EQUIVALENTS ENGINES

P. Asquin.....Chicago
S. V. Gananny.....Pleasant Hill, Ill.
B. Dresser.....Homedale, Idaho
H. J. Creasy.....Ruthven, Ontario
Fred L. Stanton.....Covington, Ind.

THE ELECTRIC SYSTEM

C. T. Mock.....Bartow, Fla.
R. S. Bergsather.....Bricelyn, Minn.
F. W. Leis.....Danville, Ill.

REBUILDING

M. Fuldwan.....Springfield, Ohio
John Blake.....Rolling Prairie, Ind.
C. R. Scott.....Washington

MISCELLANEOUS

V. L. Couture.....Lewiston, Me.
Harry Hosoda.....Salt Lake City, Utah
Hugo Dutzer.....Seattle, Wash.
J. T. Duffey.....St. Paul, Minn.
W. E. Click.....Elkhart, Ind.
M. L. Cash.....Plains, Kan.
W. F. McLaughlin.....Shiocton, Wis.
P. Asquin.....Chicago

No communication without the writer's name and address will be answered in these columns.

electrolyte to reach any part of the active material quickly. We do not believe that there is any difference in the separators for lighting and starting batteries.

4—When a battery becomes frozen the plates are ruined because the active matter drops out of the grids. When such a battery is taken apart the active material from the plates very often sticks to the separators. There is no way of reviving the ruined plates. The only remedy is to cut off the positive plates and burn in new ones.

Engine Has Piston Slap

Q—My 1914 Ford has a slight piston slap at some speeds. The pistons are tight and everything is O. K. The knock does not answer to any other knock. Could it be due to connecting rods being out of true? Is this the chief reason for piston slap?

2—The clutch on my car does not work well, as it is always more or less jerky, however adjusted. Two or three garages have made adjustments, but it does not make any difference. The bands are tight and the carburetor works well. The trouble takes place when I am changing from low to high. How can this be prevented?—H. J. Creasy, Ruthven, Ont.

1—Piston slap in an engine is not necessarily due to the connecting rod being out of line. Loose pistons are generally the

cause and the looser they fit the greater the slap. The slap may be due to worn cylinders or to excessive clearance with aluminum pistons when the engine is cold, at which time the pistons are contracted to quite an extent. However, with correctly fitted aluminum pistons this slap is done away with. The reason there is a pronounced knock in an engine with one or more loose fitting pistons is shown diagrammatically in Fig. 1. This shows the piston at various points of travel on the compression, explosion, exhaust and suction stroke. The arrows shown on the piston indicate the direction in which it is carried, due to the thrust of the connecting rod. There may be two or more knocks during the cycle of operation. Generally, however, the only one heard is that when the piston shifts from one side of the cylinder to the other at the upper dead center, when the explosion occurs. Thus when the piston is on the compression stroke it is brought into contact with the right side of the cylinder. But just as soon as the crankpin turns past dead center the angularity of the connecting rod is changed from the right to the left side, thus pulling the piston to that side. Under the full pressure of the explosion the piston strikes the side with considerable impact. It is this rapid change from side to side that causes the peculiar knock known as piston slap. When the cylinder exhausts, the piston is thrown again to the right side but with less impact.

Disks Need Replacing

2—From the nature of the trouble it seems that the disks in the clutch need replacing. These plates, or disks, get considerable use and eventually become worn so that the clutch adjustment has no effect on them. A jerky action of the clutch which cannot be remedied by turning the slotted adjustment screws on the driving plate of the clutch is almost always a sure sign that the disks are worn and replacing. If there is jerky action when the low-speed pedal is applied it means the lining is worn on the transmission bands, or the bands are too loose. When adjustment makes no difference to the action of the reverse, brake, or low-speed pedal, the lining must be replaced. Also some lining is very much inferior to others and gives a rather harsh action. We suggest that you try some of the lining now on the market in which cork inserts are incorporated.

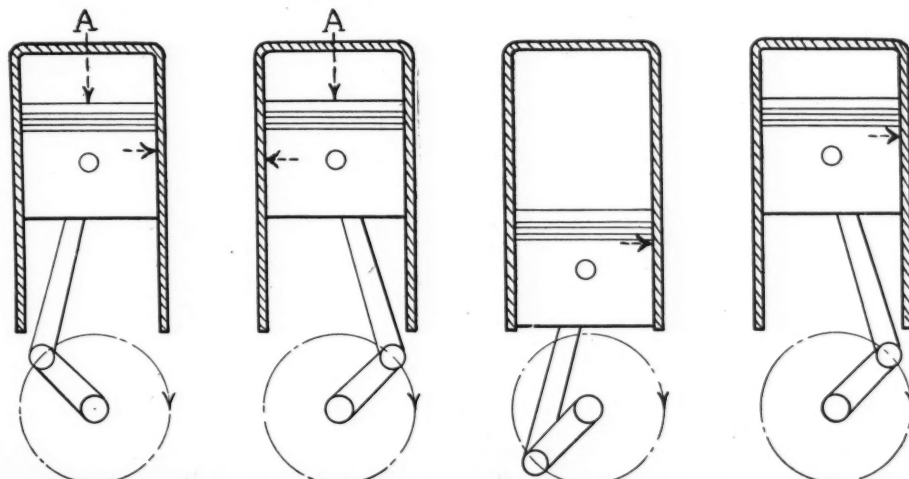


Fig. 1—How piston slap is caused by worn pistons, rings or cylinders. The arrows show the thrust of piston at various strokes

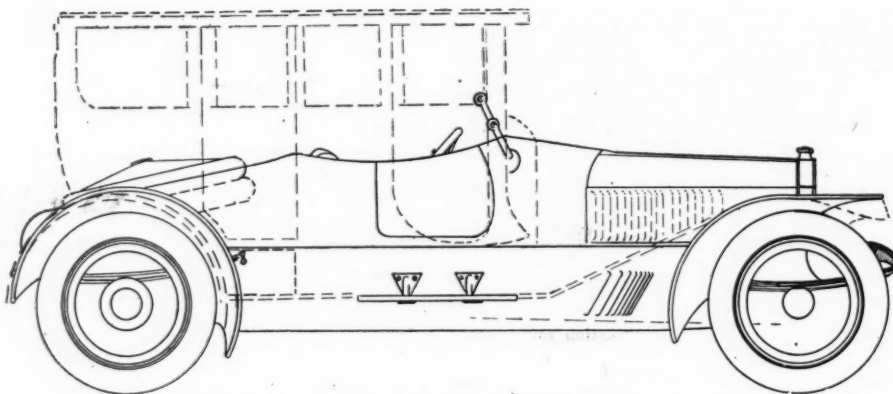


Fig. 2—Suggestion for converting 1912 Winton touring car into roadster, with extra wheel on rear

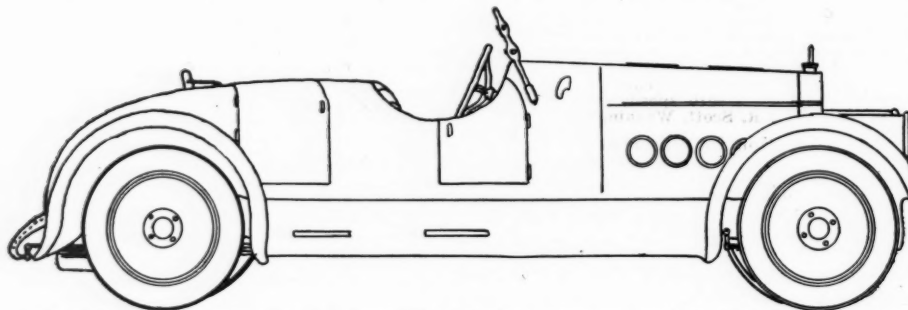


Fig. 3—Four-passenger sport car designed by reader. Steps are used in place of running-boards

Such lining is very effective in preventing chatter. When starting on low gear reverse or apply the brake pedal.

Engine Starts Hard

Q—What is the reason my Empire six does not start better when it is warm? If it has been standing for a day or so it will start at once by pulling on choke, as I have the mixture very lean, but after it is warmed up good, it is sometimes very hard to start.—Fred L. Stanton, Covington, Ind.

Your engine probably starts hard when it is warm because the mixture is too lean, or ignition poor. Another reason may be that the plugs become sooted from over-lubrication or if they have been used for a considerable time the points may be burned and corroded. There are other reasons that make hard starting after the engine has been warmed up. For instance, the gasket on the cylinder head may be leaky and when the ignition is switched off water may collect on the plug points and prevent a suitable spark. After the engine stands for a time the heat may evaporate the water so the engine can be started again. You should go after the carburetor first and make sure it is set correctly, because an engine should start easier, other things being equal, when warm than cold.

The Electric System

Battery Will Not Charge

Q—I am having trouble with the electrical system on a model 26 Chalmers, mainly, now, that I am not able to get the generator to charge the battery. The car came in with the wires badly mixed up, and inasmuch as the starter, lights and ignition are perfect, I believe I have the wires right, but am not able to get the thing to charge and ask that you will furnish me with a wiring diagram of this system and help me out with a way to trace the trouble. I am not able to locate any cut-out on this car and do not understand how it works out.—R. S. Bergsather, Briceyn, Minn.

Inasmuch as your electrical system seems to be in good working order we are led

to believe that your trouble lies in the ammeter, if you have one, either being connected up wrong or in not being connected at all. Fig. 4 will give you the proper method of wiring in use on this model and should enable you to find and correct your trouble. If your starting motor works all right it shows that the battery is being charged. If the battery, however, will not turn over the starting motor, look for a defect in the battery, provided there are no grounds or shorts. We recently came across a battery that would not hold the charge and examination showed the middle cells dead, caused by foreign matter in the bottom of the cell. After the battery was washed the trouble disappeared.

Composition of Distributer

Q—What is the composition of the clay-like substance on the Remy distributor and how is it shaped and baked?—C. T. Mock, Bartow, Fla.

This substance is known as Bakelite,

which is a phenol product and is received at the factory in the form of a yellowish powder, which when put in a steel mould and subjected to approximately 50 tons pressure, as well as heat, changes from a powder to a liquid then to a solid, in which form you find it on a distributor.

Ammeter on Dort

Q—Publish diagram for installing ammeter in a Dort car.—Harold D. Raphael, Detroit.

A wiring diagram of the Dort, showing installation of ammeter is given in Fig. 6. You will note that the dashlight installation calls for another fuse, as this system of wiring utilizes fuses between each accessory and the battery. The ammeter is inserted in the wiring line shown. It is necessary to cut the wire and run leads to the ammeter from each of the cut ends. If, after the installation is made, the ammeter shows discharge when it should show charge it may be corrected easily by switching the wires on the ammeter.

Ammeter Needle Fluctuates

Q—I have a Splitdorf generator which has been giving me trouble. When starting the engine the ammeter will show charge, but after driving the ammeter hand will drop back and forth and is very unsteady and at different times it is necessary to speed the engine up to 20 or 30 m.p.h. before the ammeter hand will leave zero and start to change. The points and brushes are in good shape. Do you think the fields could be oil-soaked, or what could be the trouble? Do the Splitdorf people put out a book on ignition? I took the generator to a competent electrician some time ago, but he did not make much, if any, improvement. He told me that one of the fields was oil-soaked and that he baked it and also found a grounded wire, so I had to take his word for it and pay him \$5 for practically no service. I do all my own work and have for the last four years, so any information you can give me will be greatly appreciated.—F. W. Leis, Danville, Ill.

The unsteady action of an ammeter needle may indicate several things. For example the instrument itself may be at fault or the cut-out may not be functioning properly. A loose connection somewhere in the line will cause the same thing. If the ammeter does not register with the engine running and lights out, stop the engine and switch on the lights. If the ammeter shows discharge, it is likely that the trouble lies in the generator or connections. Should the ammeter register discharge with all lights on, the engine not running, look at the cut-out or relay points and see if they are closed. If not, disconnect the battery, which under favorable conditions will cause the hand of the ammeter to return to zero. If the generator with which you are

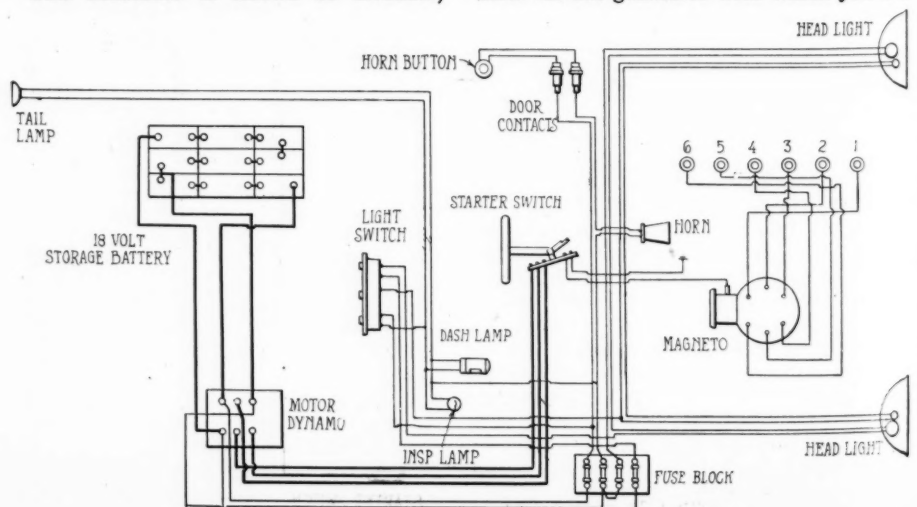


Fig. 4—Wiring diagram of Entz electric system on Chalmers 26

using this ammeter has adjustments for varying the charging rate, try this and see if it makes any difference.

It may also be simply a case of high mica in the generator. This means that the mica insulation to the commutator segments is too high or even with segments. Thus when the generator is revolving, the brushes bear down on both the commutator segments and insulation, making poor contact. The remedy is to remove the armature and undercut the mica. Sometimes new brushes only are needed. We believe if you take your car to a competent service station and have it looked over by a good trouble shooter, you will be able to discover any fault. Trouble in the electrical system is sometimes very difficult to locate as it takes but a small item in this part of the car's makeup to throw the system out.

Rebuilding

Rebuilding Winton Six

Q—Suggest a roadster design for rebuilding a 1912 four-passenger Winton six. It should carry one extra wire wheel and one extra rim.—M. Fuldwan, Springfield, Ohio.

In Fig. 2 is shown a suggestion for rebuilding a 1912 Winton six into a roadster.

Four-Passenger Sport Body

Rolling Prairie, Ind., Editor MOTOR AGE—I am inclosing a motor car body design which is to be a four-passenger sport body for a chassis of about 135-in. wheelbase. There are no runningboards, short steps being used in their place. The fenders are rounded and curve far over the disk wheels. Wide metal coverings between the front and rear fenders hide the frame and under parts. The headlights are built into the front fenders but over slightly toward the radiator. There are round screen-covered ventilators in the hood. There is a deep cowl with ship ventilators in the sides to keep the front compartment cool during warm weather. They may be opened or closed at will. The windshield also may be opened. The steering wheel is very low. The seats are also low, resting nearly on the frame. The backs are high. To the rear of the front seat is a long deck inclosing the two-passenger rear seat which may be opened quickly. Entrance to this seat is through a door on each side. In the center cowl is a disappearing top to be raised when the car is used as a two-passenger and in the rear deck is a longer disappear-

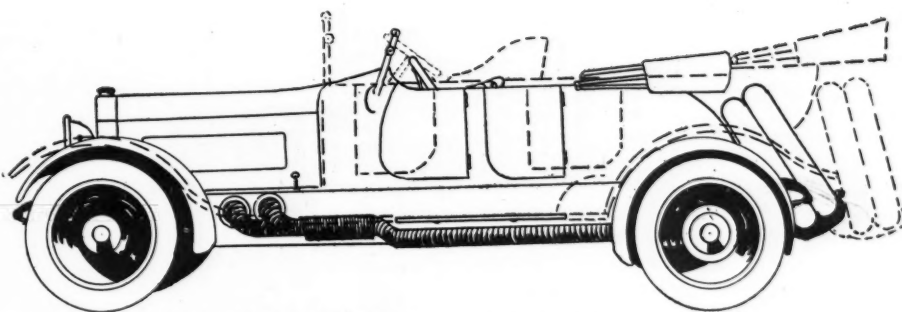


Fig. 5—Suggestion for cutting down 1913 Peerless into speedster

ing top, to be raised when the car is used as a four-passenger vehicle. Back of this is a roomy luggage compartment. The upholstery is deep and soft and all the appointments are luxurious.—John Blake.

Rebuilding 1913 Peerless

Q—Give directions for cutting down Peerless model 36, 1913, into speedster or four-seated roadster.—C. R. Scott, Washington.

A suggestion for this is shown in Fig. 5. The dotted lines are those of the old body and you will note the new body has been shortened to make a four-passenger roadster. The same hood is used, while individual fenders are fitted. The exhaust line opens through the apron over frame and is led to the rear.

Miscellaneous

Age for A. A. A. Racing

Q—How old must one be to enter the A. A. A. races?

2—On a racer like Mr. Hartz's, would not the axles rock back and forth if the body is on springs, and what would be the remedy for this?

3—Illustrate Brent Harding's miniature racer?—V. L. Couture, Lewiston, Maine.

1—No person less than twenty-one years of age is eligible for registration as a driver or mechanic or permitted to participate in a sanctioned event. Also no driver or mechanic will be allowed to compete in any sanctioned event unless he has been registered and is in good standing.

2—Wherever quarter-elliptic springs are used there is bound to be some rocking of the axle. This has been overcome in some cases, especially in small European cars, by using two quarter-elliptic springs, one above and one below the axle on each side. To the ends of the springs is fastened a forging similar to a shackle through the center of which the axle tube is placed.

The spring action on such a car will allow the axle to be carried up or down in a perfect vertical line. Sometimes where quarter-elliptic springs are used, rocking of the axle is prevented by radius rods.

3—We have no illustration of this small car at the present time.

Axle Shafts Keep Breaking

Q—I have a 1916 Buick, which is giving me trouble because the right-hand rear axle is twisted and broken. I placed a new one in, but it broke again in the same way in about a week, and the third axle is commencing to break. What is the cause and remedy for this?—Harry Hosoda, Salt Lake City, Utah.

Where an axle shaft persists in breaking it is either the fault of the axle itself or in the installation. It is not likely that two or three axles will be received that are not made of good material. Consequently we believe your trouble lies in the application. It is possible that the bearings on this side may be worn to such an extent that the axle shaft has too much lateral play. This causes the axle to pound, especially in rough going and ultimately causes crystallization. The remedy would be to install new bearings, for an axle shaft with good bearings should give satisfaction for many thousands of miles. Occasionally it happens that a shaft is snapped by too sudden application of the brakes of power. Also the right axle gets more wear than the left, owing to the contour of the roads, which puts a greater thrust on this side in addition to taking the driving and braking strain.

Clutch Needs Adjusting

Q—I have a twin-six Pathfinder seven-passenger touring car, model 1-B. This is not the body with the overhanging frame. I was caught in heavy sand a short time ago and my clutch slipped to such an extent that the rear wheels would not turn. How can I tighten the clutch? I also have difficulty in shifting my transmission gears, especially low gear. They seem to rotate too fast to get in mesh. Is that the fault of the clutch not releasing sufficiently, or is it the gears?—Charles F. Kuppert, Washington, D. C.

The clutch in this car is of the multiple dry-plate type with adjustable foot pedal. The disks consist of steel plates covered on both sides with Raybestos. Normally these disks require no attention. However, since your clutch is slipping you must adjust it. To get the adjustment remove the aluminum plate on top of the clutch housing. On the inside of the clutch toward the gear-set will be found three adjusting nuts, marked A in Fig. 7. To tighten the clutch turn these nuts to the right. Only a little adjustment is necessary. You can then try out the car again and see if the trouble has been remedied. The fact that you have trouble shifting gears is due, no doubt, to the condition of the clutch. When a clutch does not release properly it permits the

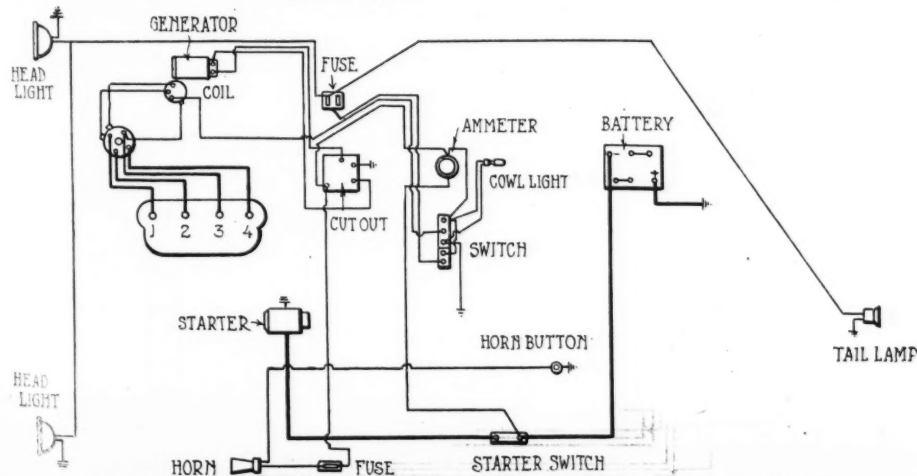


Fig. 6—Wiring diagram of model 5 Dorr, showing manner of connecting ammeter

clutch shaft to rotate too fast to shift gears. To shift gears easily the clutch must be stopped spinning sufficiently so that all gears are going at about the same rate of speed. Trouble in shifting also may be due to worn shifter forks, or bent parts. This would make gearshifting difficult, especially in the lower gears. Before suspecting this, however, it is well to adjust the clutch first.

Design for Air Cleaner

Seattle, Wash., Editor MOTOR AGE—I am submitting to you a sketch showing design for an air cleaner for tractors, etc., which, it seems to me, permits only washed and clean air to enter into the crankcase and carburetor, excluding all dust and alkali. The air cleaner and oil reducer are attached to the breather openings and the air is drawn by suction, vacuum or force feed through crankcase. Thus the air is warmed up before going to the carburetor by being passed through the crankcase. The carburetor is entirely inclosed with adjustment accessible through openings which can be closed with cover plates.—Hugo Dutzer.

Determining Wire Size

Q.—What rule is used in wiring a motor car? How is the size of the wire to be used determined? What is the reason that on some cars a heavy cable is used, while on others a much lighter is used? Why are cables made out of twenty or thirty small strands? What difference would it make if large or small cables were used to run from a storage battery to lights?—J. T. Duffey, St. Paul, Minn.

The size of wire used in the starting and lighting system on a motor car is dependent upon the amount of current to be carried. For instance, the reason wires going from the starting motor to the battery are so heavy is because the current here, when first starting, is anywhere from 80 to sometimes as much as 375 or 400 amp. This current is flowing but a brief period, but the wires must be heavy enough to take care of it. The wires which run from the battery to the generator are very much smaller and can be so because here the current is much smaller, being anywhere from 5 to 25 amp. Comparison might be made with water pipes. If 100 gal. of water were to be passed through a pipe an hour it would take a much larger pipe than if you attempted to pass only 25 gal. in the same time.

The size of wire to use depends not only on the amount of current but also upon the length of the wire, or, in other words, how far this current is to be carried. It will be evident that the longer the wire, the greater the resistance offered to the flow of current. Hence, if the wire is not of sufficient size there will be a drop in voltage at the terminals. The table herewith shows the size wire to be used with a given amperage when the length of wire is known. Suppose, for example, you wish to carry 10 amp. of current for a distance of 8 ft. To find the wire number to be used, run down the column under 8 ft. until you come to the figure in line with 10 amp., which in this case will be 14. Therefore, No. 14 wire should be used. Generally speaking the wires coming from the generator to battery and lighting switch can be No. 10 B. & S. gage. Wires from the

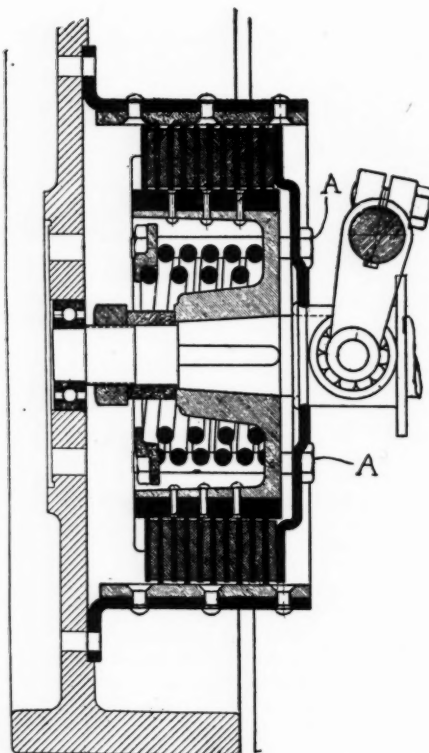


Fig. 7—Sectional view of Pathfinder clutch, showing nuts which must be tightened to prevent slipping

lighting switch to the headlamps can be No. 12 B. & S. gage, while the cable to the starting motor is generally No. 1 to 00 B. & S. Gage.

Play in Steering Gear

Q.—Is it possible to take up play in the steering gear of a model 54 Crow-Elkhart? If so, how?—W. E. Click, Elkhart, Ind.

After the car has been driven for a season or longer it may be noticed that there is an objectionable amount of play, or lost motion, in the steering wheel. Investigation probably will show that this is caused

by backlash between the worm-and-worm wheel, due to wear of these parts and also to wear of the trust washers, TJ-33 and 44, at either end of the worm. Owing to the reduction between the worm and worm wheel only a quarter section of the worm wheel comes in contact with the worm while the front wheels are turned through their complete angle of deflection. When this section of the worm wheel shows appreciable wear the steering ball arm, TJ-25, can be removed from the square end of the worm-wheel shaft and the steering wheel turned until another quarter section of the worm-wheel is brought into action. Then replace the steering ball arm and clamp it securely in place with the screw provided. In this way the wearing portion of the worm wheel can be renewed three times.

Wear in the worm thrust washers can be taken up by loosening the clamp screw at the top of the steering gear housing and turning the large adjustment nut, TJ-34, to the right. The nut should not be screwed down too tightly, as this would make the gear work stiff. The adjusting nut bears down on the thrust washer between it and the upper end of the worm and takes up any play in the worm or steering wheel.

Any end play in the worm-wheel shaft can be taken up by loosening the nut, 3026, at the center of the cover on the side of the steering gear housing, TJ-20, and turning the slotted screw, TJ-24, which projects through the nut to the right. This screw extends through the cover and bears against the face of the worm wheel, holding the wheel against the opposite side of the housing and preventing end-wise movement of the worm wheel shaft.

All bushing, thrust washers and other parts of the steering gear, which now become worn from long service, easily can be taken up by loosening the nut 3026 at the center of the cover on the side of the steering gear housing, TJ-20, and turning the slotted screw TJ-24, which projects through the nut, to the right. This screw extends through the cover and bears against the

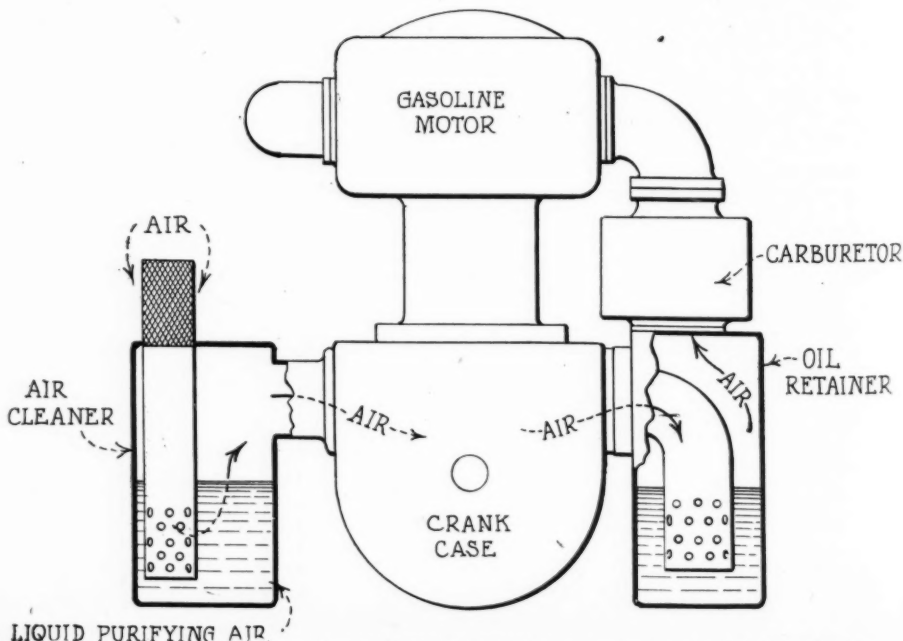


Fig. 8—Sectional view of air cleaner designed by reader whereby the air is drawn through purifying liquids and crankcase

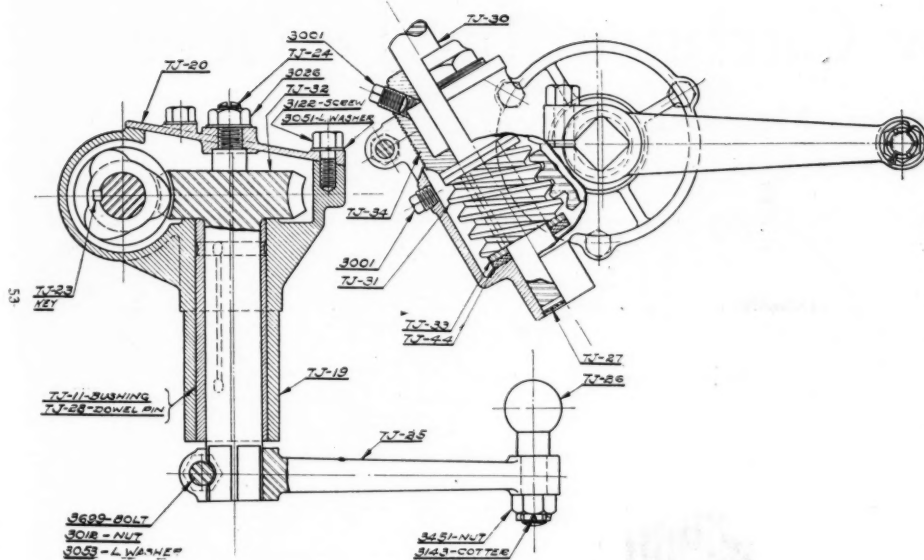


Fig. 9—Sectional view of steering gear similar to that used on Crow-Elkhart

face of the worm wheel, holding the wheel against the opposite side of the housing and preventing endwise movement of the worm wheel shaft.

All bushings, thrust washers and other parts of the steering gear which may become worn from long service easily can be removed and replaced with new parts.

Radiator May Be Clogged

Q—I have a 1917 Chandler six that has begun to heat very badly in the last month and I have not been able to overcome it. I have put in a new pump, as the old pump was worn out, and I have renewed the radiator hose with very good hose, none of which seems to do any good. I have come to the conclusion that the radiator has become clogged with scale and sediment, impairing the circulation. Will you give me the best solution that I may use to clean the radiator of the scale lime and sediment in this type of car?—M. L. Cash, Plains, Kan.

While your trouble is no doubt caused by a clogged radiator, it might be a wise precaution to check up on the timing of your magneto and to inspect the distributor brush. A late spark will cause overheating and a distributor brush put in backward will have the same effect.

The best and most commonly used solution for removing scale from the water jackets and radiator is a strong one made of hot water and common washing soda.

Assuming the deposits light, the following is the way to go at the job:

1—Dissolve $1\frac{1}{2}$ lb. of common washing soda in 2 gal. of water and, keeping this proportion, make enough solution to completely fill the system. Mix it in a wash boiler and keep it at about the boiling point on a stove.

2—Drain water from radiator; close drain cock.

3—Remove fan belt; this keeps the solution hot with engine running.

4—Fill radiator with soda solution and let the engine run for about 10 min., if the engine has a pump. If thermo-syphon system is used, run longer, say 20 min. This gives the solution a chance to thoroughly clean out the jackets and radiator.

5—Stop engine, drain off solution and refill with clear soft water.

If this treatment has not removed all the lime deposits, it may be necessary to repeat the operation in a day or so. In fact it generally will be found that if the treatment is applied again in a few days, much more deposit can be freed. Lime deposits act as an insulator, with the result that heat is not carried away properly when the air strikes the radiator fins.

In very bad cases the acid treatment can

be used and should be applied as follows:

1—Make a solution of hydrochloric acid and water, using one part acid to eighteen of water.

2—Have on hand a soda solution, made in the proportions as above, keeping it hot.

3—Drain system and close drain cock.

4—Pour in the acid solution and let the engine run as before, allowing a longer period for thermo-syphon systems.

5—After running engine for required period, drain off solution and immediately pour in the soda solution. The purpose of the latter is to neutralize the acid, should any remain in the radiator. Run the engine with the soda solution for several minutes and drain.

6—Refill system with clear soft water.

7—Replace fan belt.

Peculiar Noise in Axle

Q—I have a Chevrolet Baby Grand, 1913, which when running makes a peculiar roaring noise, especially if leaning to the left side. The roar takes on an intermittent grating, vibrating. Would you think this is caused by the differential? Sometimes it seems to be more amidships. It runs fine and pulls good, but when idling it does not run evenly and with spark advanced there is a distinct knock. I have had the connecting rods tightened but the knock seems to be just the same. It has been suggested by a mechanic that it might be the wristpin. What would be a remedy?—W. F. McLaughlin, Shiocton, Wis.

Your trouble is no doubt caused by a faulty bearing in the differential. Noises have a habit of traveling through the various parts of the chassis, and a rear axle noise would travel through the propeller shaft, leading one to think that it was amidships.

The engine's refusal to idle properly is no doubt caused either by leaky valves or by air passing by the valve guides. Try squirting gasoline around the valve guides, and if the engine picks up and runs evenly the trouble is with the fit of the valve stems in their guides.

The knock is caused either by a loose wristpin or possibly by a worn or sloppy piston. The only remedy would be to pull the engine down and locate the trouble.

Largest Truck Makers

Q—Who are the makers of the heaviest capacity truck and what is the name of it?—P. Asquin, Chicago.

The Mack motor truck has a capacity of 10 tons and is built by the International Motor Co., New York.

		No. Feet of Wire																			
Amperes		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	1	33	30	28	27	26	25	25	24	24	23	23	22	22	22	21	21	21	21	21	20
	2	30	27	25	24	23	22	22	21	21	20	19	19	19	19	18	18	18	18	17	17
	3	28	25	24	22	21	21	20	19	19	18	18	18	18	17	17	16	16	16	16	15
	4	27	24	22	21	20	19	19	18	18	17	17	16	16	16	15	15	15	15	14	14
	5	26	23	21	20	19	18	18	17	17	16	16	15	15	15	14	14	14	14	14	13
	6	25	22	21	19	18	18	17	16	16	15	15	15	14	14	14	13	13	13	13	12
	7	25	22	20	19	18	17	16	16	15	15	14	14	14	13	13	13	13	12	12	12
	8	24	21	19	18	17	16	16	16	15	14	14	13	13	13	12	12	12	12	11	11
	9	24	21	19	18	17	16	15	15	14	14	13	13	13	12	12	12	11	11	11	11
	10	23	20	18	17	16	15	14	14	13	13	13	12	12	12	12	11	11	11	11	10
	11	23	19	18	17	16	14	14	13	13	13	12	12	12	11	11	11	11	10	10	9
	12	22	19	18	16	15	15	14	13	13	12	12	12	11	11	11	10	10	10	10	9
	13	22	19	18	16	15	14	14	13	13	12	12	11	11	11	10	10	10	10	10	9
	14	22	19	17	16	15	14	13	13	12	12	11	11	11	10	10	9	9	9	9	9
	15	21	18	17	15	15	14	13	12	12	12	11	11	10	10	10	9	7	9	9	9

Fig. 10—Chart showing wire size to use when wiring the lighting system. The longer the wire the greater the resistance, hence wire must be of sufficient size

Four New Carburetion Devices

Universal Airgas, Manifold, Hodges and Kerosene Equipment with Their Characteristics

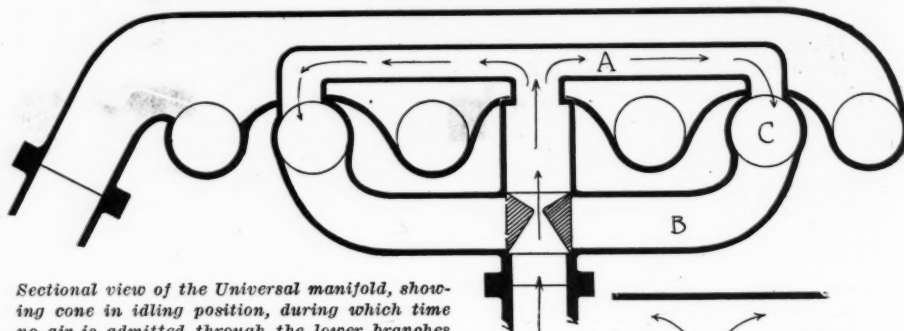
FOUR carburetion devices have recently been introduced, three entirely new instruments while the fourth is the modern piece of apparatus put out by a kerosene company which has been marketing instruments before this. It is interesting to know that in all the four devices a venturi is used in some form or other. The lower grades of fuel, by which is meant not so much lower gravity as higher boiling points and less uniformity in range of boiling points of different fractions of the fuel, have apparently been considered in producing these devices to insure economical operation. It also will be noticed that in most of the apparatus described herewith there is a total lack of adjustment, which means that once the device is installed correctly the driver need make no changes.

In one, the Universal Airgas carbureter, no more is generated than is needed for immediate consumption, in other words, the consumption automatically governs the production. The Universal manifold is a simple device said to make crankcase distillation impossible. It has been given severe tests with low-grade fuel, on tractors and trucks principally. It is a manifold within a manifold, but the engine is not fed heated air while under load but only fuel that has been subjected to from 400 to 600 deg. heat. It will also be noted from the illustrations that the fuel is treated with heat after the throttle or turns in the manifold have been passed, which is said to eliminate condensation. In the Hodges carbureter, which is of rather odd design, the air is regulated and controlled according to the speed of the engine directly rather than by engine suction. Another feature of this device is that a governor is used in connection. The special feature of the Kerosene Equipment, consisting of an outfit designed primarily for Ford cars, is a double venturi and two jets, making it possible to have high velocities through the venturi at low engine speeds, while the sliding venturi which operates at higher speeds automatically cuts in the second jet. The operation and basic principles of the four devices follow:

Universal Manifold

The object of the manifold introduced recently by Fish & Perry, Chicago, is to treat the fuel without heating the engine. When the engine is started, or while running slow, all air and fuel are drawn up through the cone, or moving member, in the center of the manifold and enter the engine through the small intake pipe surrounded completely and heated by the exhaust gases. Thus with kerosene, it is said, there will be no crankcase distillation, because both air and fuel are heated while idling.

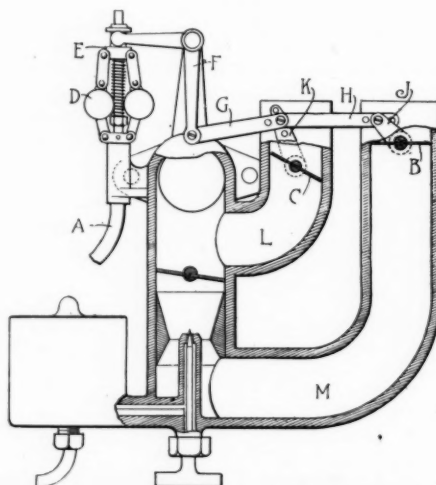
The makers claim superiority over heated manifolds because the engine is not fed heated air while under load but fuel that has been subjected to from 400 to 600 deg. of heat.



Sectional view of the Universal manifold, showing cone in idling position, during which time no air is admitted through the lower branches of the intake. Right, cone in elevated position, with arrows to show course of fuel and air

In operation this device is automatic. When running slow or idling the cone is at the bottom of its travel and the gases pass entirely through the hole in the cone as the lower portions of the manifold that branch out from this point are closed completely by the cone. When the throttle is opened the increased suction causes the cone to rise, opening the ports in the manifold at the right and left sides. The fuel, being heavier than the air, continues to pass upward through the hole in the cone but the air turns to the right and left in the lower manifold and re-unites with the heat-treated fuel at the cylinder ports. Owing to the short distance the mixture travels after mixing, it is practically impossible, it is said, for it to condense.

Another feature is the treating of the fuel with heat after it has passed all butterfly valves and governors or bends in the inlet manifold, responsible in many cases for condensation with most any kind of fuel. The cone which consists of a cylinder machined out on the inside in the shape of a double cone is a loose fit, having about $\frac{1}{32}$ -in. play. Thus it cannot stick and



Sectional view of Hodges carbureter on which a governor is used to operate valves B and C, which here are shown in low speed or idling position

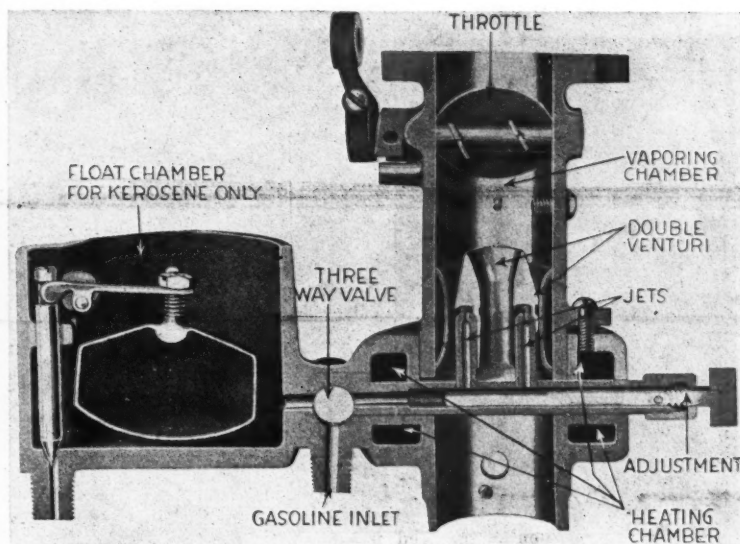
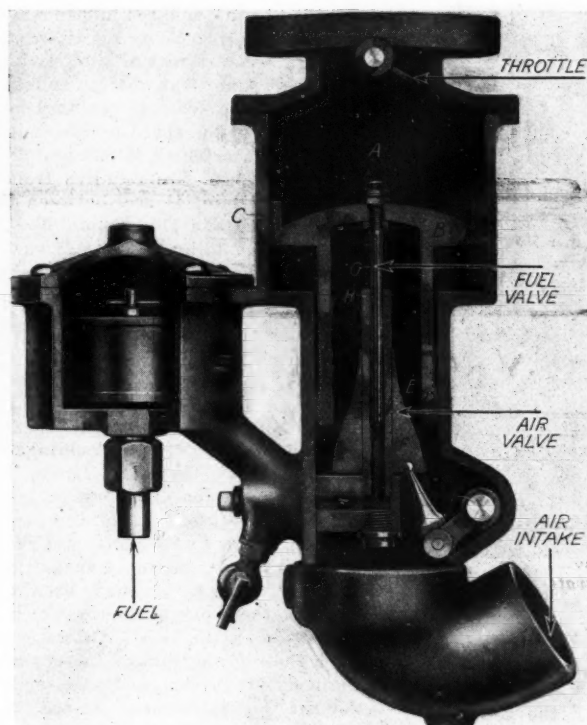
is lubricated further by the fuel to some extent.

Any make of carbureter can be used with this manifold and requires from 30 to 40 sec. to heat sufficiently to run on kerosene. Kerosene starts to vaporize at 90 deg. Fahr., with complete vaporization at 375 deg. The heat in the inclosed small manifold attains by test better than 500 deg. and keeps the fuel at that point to the engine ports. On a test covering a period of two months with tractors, trucks, etc., thermometers were inserted at various points on the manifold together with a recording electrical pyrometer, to observe the action of the engine with manifold installed as in the photograph of the tractor. A temperature of 400 to 550 deg. depending on engine speed was maintained at A, while at B the temperature was atmospheric, with the mixture temperature at C constantly at 160 deg. F.

Any desired temperature can be had by changing the diameter of the hole through the cone, thus passing more or less fuel through the tube. The makers claim that with a heated manifold of the more conventional type the highest temperature possible is something like 235 deg., which is 70 to 80 deg. too hot for power and 140 to 165 deg. too cold for complete vaporization of kerosene, causing considerable waste.

Universal Airgas

The Universal Airgas carbureter embraces a system of automatic regulation of gas-to-air ratio. No more gas is generated than needed for immediate consumption, that is, the consumption automatical-



Above—Sectional view of the Kerosene Equipment Co. carburetor, showing the double venturi and heating chamber

Left—Sectional view of the Universal Airgas carburetor, which has no adjustments. The fuel valve is the only moving part and this automatically adjusts itself to the requirements of the engine

ly governs the production. The process is unaffected by barometric pressure or changes in temperature, insuring at all times, it is said, a uniform, quality mixture. It is universal in that it can be used on any size or make of engine within its capacity indiscriminately, without alteration or adjustment, on trucks, tractors, passenger cars, airplanes, marine and stationary engines. It is made by the International Gas Machine Co., Chicago.

Operation of Device

The illustration shows a sectional view with the throttle partly open, in which position the operation of the engine creates a partial vacuum in the chamber A above the piston C of the controlling element B. The element B then will use and assume the position shown, with the requisite area provided by the annular opening formed between the neck D of the tube, or mixing chamber, E, and the cam F, to allow the amount of mixture called for to pass through the mixing chamber into the upper chamber and re-establish the pressure.

The controlling element carries with it the fuel valve G, made with longitudinal tapered grooves, and as it rises the orifice at the nozzle H is increased. The depression, or vacuum, existing within the mixing chamber and around the nozzle is constant. This depression causes the fuel to issue from the nozzle in the form of a spray absorbed by the incoming air, whereby gas of a fixed quality is generated and predetermined by the proportional areas of the annular space formed by the neck of the mixing chamber D and the cam F and the area of the grooves, or slots, in the fuel valve when opposite the nozzle H. Thus, with the engine running the wider the throttle is opened the higher the controlling element rises, carrying with it the fuel valve and increasing the effective area of the fuel orifice at nozzle. This increases the feed of fuel in proportion to the gas called for by the load or speed of the engine.

The tapered grooves in fuel valve G are proportional with respect to the shape of the cam and the neck of the mixing chamber, so the ratio between air and fuel is constant for all positions of B. The ratio may be changed, for instance, for enriching the mixture when starting, or the utilization of any grade fuel desired, by raising the cam F with the lever I, connected to the dash. This arrangement also compensates for leaky valves or pistons.

The controlling element is positive in action and remains stationary at any fixed load, while responding immediately to any variation or change. This action was watched by a MOTOR AGE representative through a glass window built on a test carburetor.

The pistons C and D are a loose fit, and the difference in their areas effectively prevents any tendency for the element to flutter while operating. Also the vertical movement of the element prevents the slots from clogging. All the air passes through the fuel jets, six in all, the resultant mixture being perfectly homogeneous and having an air-gas ration, it is said, of 98½ per cent to 1½ per cent. The instrument operates with a fixed internal depression determined by the weight and area of the controlling element.

Kerosene Equipment

In this carburetor made by the Kerosene Equipment Co., Detroit, the breaking up of the fuel is by a double venturi acting as an atomizer. Then moderate heat, 200 to 225 deg., taken from the exhaust is carried around the atomized fuel vaporizing it. This wet vapor is carried through a drying chamber in the intake manifold where the wetness is taken out. The dry vapor is gas in which form it is introduced into the cylinders. Thus there are three distinct operations, atomizing, vaporizing and drying.

The pre-heater, which surrounds the fuel

inlet and jets, lifts the kerosene without vaporizing it. Due to the venturi construction an eddy is created and the eddy action atomizes the fuel into a very fine floating fog. The floating fog requires about 200 to 225 deg. to vaporize the fuel. The use of two venturi and two jets, one for low and one for high speed, makes it possible to use a very high velocity through the venturi at low engine speeds, adding, it is said, to the breaking up effect of the venturi. While the small venturi is operating at all times by the use of a sliding venturi, as the velocity increases, the second jet is automatically cut in and operates at higher speeds.

While gasoline is used in starting, it is only for a short period, depending entirely on weather conditions, and only then for the length of time necessary to raise the temperature of the kerosene to a point that will properly vaporize it and hold it in suspension. These temperatures were determined with a view to delivering the best all-around efficiency without impairing the volumetric efficiency. There is but one float chamber, as by the use of a three-way valve gasoline is admitted for starting. To insure a proper mixture a four-notch adjustment is provided to satisfy conditions of engine and local climatic conditions.

The complete Kerosene Equipment ready to attach to Ford engine consists of the carburetor, intake manifold with drying chamber, flexible tubes for connecting to exhaust, and a 1½ gal. gasoline tank for starting.

Hodges Carburetor

The Hodges carburetor, made by the Hodges Carburetor Mfg. Co., Marshalltown, Iowa, is of the type in which the air is regulated and controlled according to the speed of the engine directly, rather than by engine suction. It is adaptable to low grades of gasoline and will use satisfactorily, it is said, a mixture of half low-



Universal manifold attached to Fordson tractor, showing simplicity of construction

grade gasoline and kerosene. The carburetor operates in connection with a governor, with no adjustments necessary after the valves B and C are set correctly in relation with the governor. Any type of governor can be used, the illustration showing one of the ball-type as an example only.

The position of the valves B and C is that assumed when idling or running slow. As the engine speed increases the governor balls D fly outward and draw the collar E down, which in turn actuates the bell crank lever F and, through proper linkage, the valves B and C. Inasmuch as the arm J is shorter than K, valve B is opened more rapidly than C. Valve B is of such size as to allow passage of a certain amount of air, even when in its closed position for idling and running slow.

As the engine reaches high speed considerable air is drawn through the auxiliary air supply tube L, so that even though the suction becomes very great the volume of the mixture supplied remains substantially constant. Though the throttle valve may be closed, a proper amount of air for maintaining a volume can be secured through the tube L. Ordinarily, when the load on the engine reduces the speed, the driver will open the throttle valve, whereupon the relative amount of air drawn through the tube M is increased, and such air passing by the fuel nozzle will pick up the fuel, increasing the richness of the mixture for the load. When the engine has reached the desired speed and the driver closes the throttle, the amount of air drawn through the tube is reduced, but considerable air will be drawn through L into the fuel mixture passage, whereby the fuel mixture will be thinned but the total volume will be properly maintained.

By properly adjusting the controlling levers and arms connected to air valves and having the right adjustment to the fuel nozzle, it will be impossible for the engine to load up or to overload and choke with either air or fuel when the throttle is opened suddenly.

FORD PRODUCTION DECREASED

Detroit, Aug. 2—Production of the Ford Motor Co. after Aug. 1 will be 350 passen-

ger cars and 400 trucks a day which is in accord with Government desires. It was estimated that at the close of business July 31, when the fiscal year ended, the year's production would be, in round figures, 677,000 cars. The estimate is based upon the fact that during the first ten months and twenty-four days of the 1918 fiscal year the output of cars was 651,191. Since then production has been steadily decreasing. With an average daily production of 1000 during June and 750 during July the remainder of the fiscal year would total about 25,750 cars. This, added to the preceding figures, would aggregate 676,940 cars. How many Ford cars could have been disposed of easily can be estimated also from the fact that on June 10 the company had on its books unfilled orders calling for 89,242 touring cars, 9824 runabouts, 3013 coupes, 1675 sedans, 5234 trucks and 1619 chassis. Subsequent reports state the company is 110,000 cars behind.

NEW RANIER IS 1½-TON

New York, Aug. 2—The new Ranier R-6 is rated at 1½-ton and not 2½-ton, as previously announced. The truck is listed at \$1,790 and makes four models offered by Ranier, the others being ½, ¾ and 1¼-ton.

CONAPHORES FOR PIERCE-ARROWS

New York, Aug. 3—The Edward A. Cassidy Co., Inc., sales division of the Corning Glass Works, has announced the adoption of Conaphores by the Pierce-Arrow Motor Car Co. as standard equipment on its passenger cars.

A. C. A. TESTS CASSCO PUMP

New York, Aug. 2—The testing laboratory of the Automobile Club of America, New York, has completed an official test of the Cassco tire pump made by the West Side Foundry Co., Troy, N. Y., and marketed by Edward A. Cassidy Co., New York. The object of the test was to determine the time required to inflate three different size tires when the pump was being driven at different speeds. The pressure to

which the tire was inflated depended on the size, the inflation being 20 lb. to the inch of width. The results of the test indicated that the pump was able to inflate a 30 by 3½-in. tire in from 43 sec. to 1 min. 3 sec. according to the speed at which it is driven between the limits of 823 and 1138 r.p.m. A 34 by 4-in. tire requires from 1 min. 20 sec. to 1 min. 41 sec. between the speed limits of 821 and 1152 r.p.m. The inflation time of the 36 by 4½-in. tire varied from 1 min. 45 sec. to 2 min. 30 sec. when the pump ran between speeds of 828 and 1165 r.p.m.

GARDNER OUT OF CHEVROLET

St. Louis, Mo., Aug. 1—Russell E. Gardner had sold his entire stock holdings in the Chevrolet Motor Co. of St. Louis, Mo. He says the reason for disposing of these holdings are that Russell E. Gardner, sales manager for the St. Louis plant, and Frederick W. Gardner, production manager, are in the naval service. It had been announced that the General Motor Co. had taken an option on the Gardner stock company when their former buggy factory was made the body production, and an assembly plant for the Chevrolet cars. At the time the option was taken on this stock it was announced that the General Motor Co. had bought a 105-acre tract here as the site of a larger plant in this city. The deeds for this property were signed last week.

CAMPBELL TO MANAGE JOBBERS'

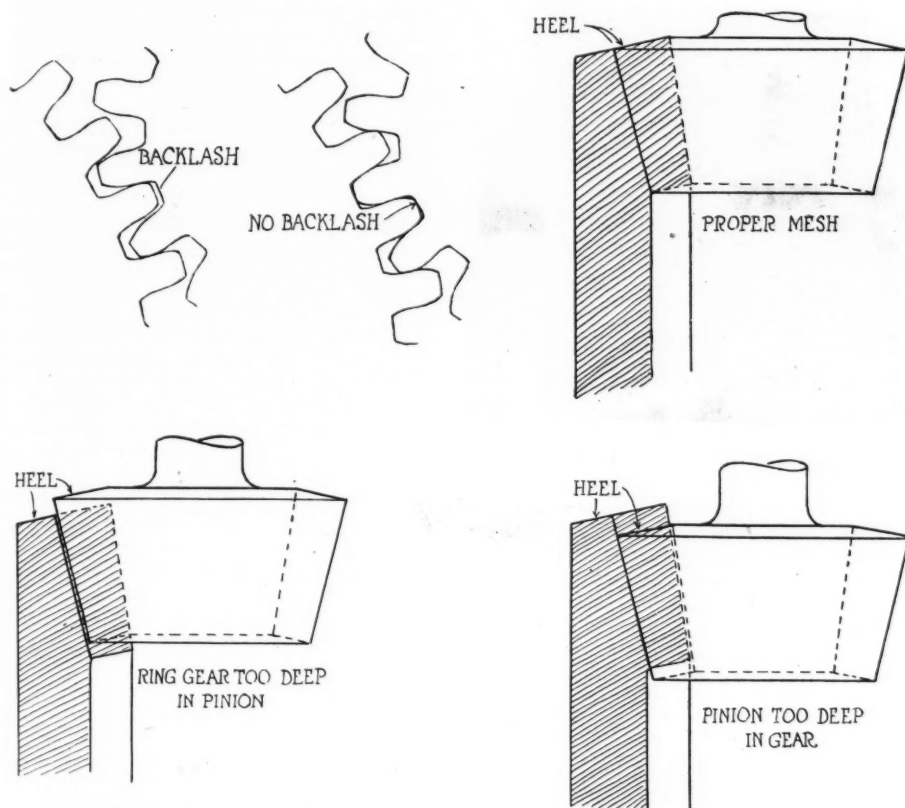
Chicago, Aug. 2—The National Association of Automobile Accessory Jobbers has definitely secured the Medinah Temple as the place of its exhibit, which is to be held Oct. 28-Nov. 2. Arrangements have been made for the decoration with the Atlantic Decorating Co., Boston, which does the Boston show every year and which did the Cleveland, Minneapolis and Kansas City shows last winter through the National Association of Automobile Show Managers. Chester I. Campbell, manager of the Boston show, and a brother of E. W. Campbell, manager of the decorating company, will manage the exhibit.

Applications for space and general interest in the project indicate that the exhibit will be successful. Commissioner Webster states that "if things go on as we hope they will, I think it will be another milestone in the organization's wonderful history."

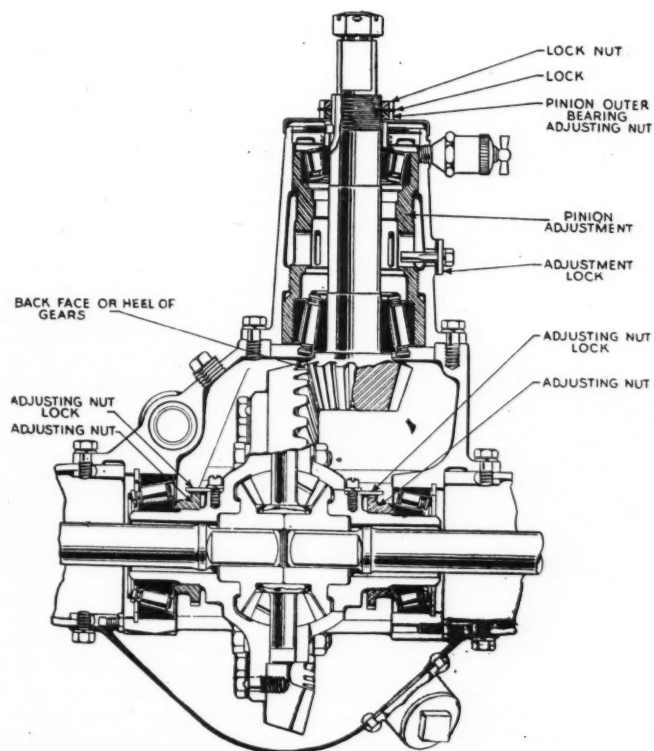
STUDEBAKER PATENTS BEVEL

South Bend, Ind., Aug. 3—Patent rights covering the use of a bevel edge around the top of a motor car body have been granted to Joseph H. Bourgon, body engineer of the Studebaker Corp., by the United States Patent Office. It is claimed that not only is the new Studebaker seven-passenger big six the first stock car to feature bevel-edge body but the same idea appeared on a Studebaker custom body job more than two years ago. In the fall of 1915 a special five-passenger Studebaker was brought out with the same bevel line. This model was called the Studebaker Bourgonette after its designer.

The Motor Car Repair Shop



Top, left, shows proper and improperly meshed teeth. Other views show ring gear and pinion which should be adjusted so the heels of both are in line. There is danger of getting the pinion too deep in the ring gear or the latter too deep into the pinion.



Sectional view of a typical rear axle drive, showing adjustments for ring gear and pinion.

Adjusting Gears

WHEN rear axle gears get noisy or sing, especially when the car is inclined on the side of the road, it is a sure sign, nine cases out of ten, that the gears are out of adjustment. There are several conditions that make possible the howls and groans that arise from the rear unit, among them the location of the ring gear with respect to pinion, too much play in the gears, or a worn bearing. Improper meshing, however, is the most usual cause. When gears are meshed properly there must be a certain amount of backlash. That is, there must be a minute distance between the teeth to make up for imperfections in the cutting of gears. Backlash will be made clear by referring to the illustration. The upper left view shows the teeth properly meshed, while the other indicates teeth with no backlash. Proper backlash should not be over 0.005 to 0.006-in. In the rear axle gears the heel of both ring gear and bevel pinion must be in a straight line, or flush, or there will be noise if gear or pinion is meshed too deeply. One of the illustrations shows the gears properly lined up, while the other shows improper position.

Two Bearings

In nearly every axle construction there are two bearings for the bevel pinion shaft. One of these bearings is just back of the pinion and the other still farther back, these positions being applied when the axle is in its normal place and you are facing it, looking toward the front of the car. The ring gear, within which are the differential gears, also is carried on two bearings, one on each side. In most gears it is possible to move the pinion back and forward a slight amount by adjustments provided for the two bearings, and there is always some arrangement made to move the ring gear either to the right or left along the rear axle line. Also play in any one of the four bearings mentioned can be taken up individually without disturbing the positions of the gears with respect to one another.

With a general understanding of axle gear adjustment a better idea is obtained as to how to proceed with the job. It is not likely that in new gears rear axle adjustments will have to be made for some time. This is work of a delicate nature and should not be undertaken by anyone unless familiar with mechanical matters.

Taking a typical example, let us assume we have a model 54 Hudson six on which the rear axle gears need adjustment. This is a 1915 car and was chosen because it is an older model where most adjusting is necessary. A sectional view of this model is shown herewith. The points of adjustment also are indicated. Before attempting the adjustment remove the inspection plate of the differential housing. In this axle, as in most designs, are locks that hold the adjusting nuts in position after they once have been set correctly. Naturally these must be disengaged before the adjustment can be made. After the inspection plate

(Concluded on page 45)

The Accessory Corner

Gasoline Strainer

THE Holtzer-Cabot gasoline strainer is so designed that the gasoline comes in at the bottom of the device and passes up through a screen, the dirt and water falling to the bottom and being removed from time to time through the screw plug at the bottom. The wire screen cup can be removed by unscrewing the top wing nuts. The body of the device is an aluminum casting with a bronze wire screen of 120 mesh with more than 6 sq. in. of surface.—Holtzer-Cabot Electric Co., Roxbury, Boston, Mass.

Improved Cell-Beam

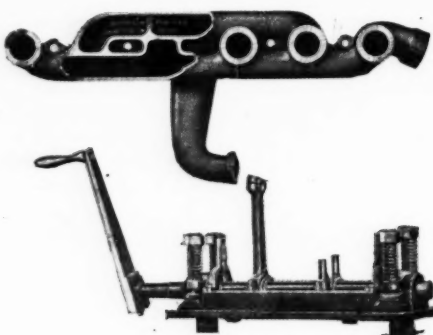
The improved Cell-Beam spotlight is a portable lamp to be carried in the side-door pocket and has been improved materially in design and construction. The body of the lamp has been strengthened, the focusing adjustment of the bulb improved, the die-cast handle is fully nickelplated instead of being merely polished as formerly, and a thicker front glass enables the lamp to stand more abuse. The length of the cord has been increased from 5 to 8 ft. and a better grade is used. The 30-cp. G-12 nitrogen Mazda bulb is etched and frosted instead of being coated. Price, \$5.—Cell-Beam Mfg. Co., 1101 Bedford avenue, Brooklyn, N. Y.

Superior Manifold

The Superior manifold for Ford cars generates a powerful gas from all gasoline or equal parts of kerosene and gasoline and will use distillate or benzol, etc., equally as well, it is claimed. The fuel can be mixed together in the tank. The gas generated supplies a soft, steady push to the piston and adds power to the engine, as well as preventing carbon accumulation, it is said. No new holes are required for the attachment, which is made with a wrench and in about 20 min. To start the engine the gasoline valve is set in the same position as for starting with standard equipment, and after the engine has run about a minute about half the quantity of fuel, gasoline or kerosene, as the case may be, can be shut off. The concern expects to market the device with a hot water tank to



Complete safety signal semaphore



Superior manifold for Fords, above, and Universal reamer



Boe barrel attachment for handling oil

prevent carbon forming in the cylinders. Price, \$15.—Superior Manifold Co., Superior, Wis.

Universal Reamer

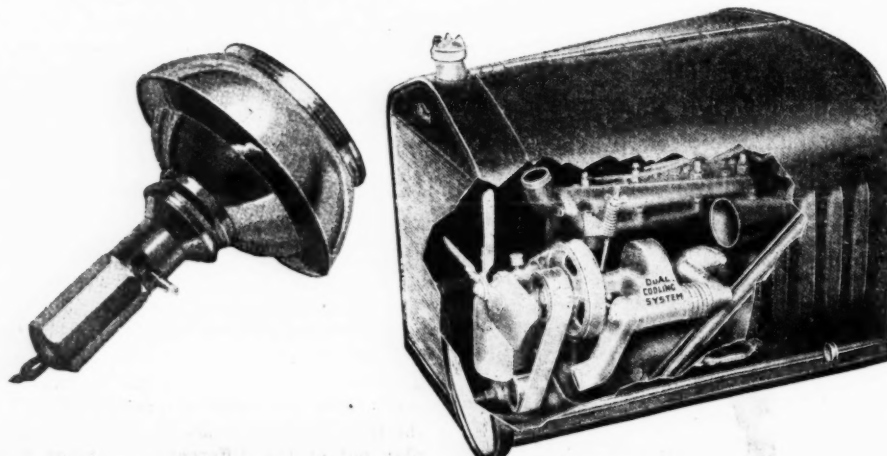
Lee's Universal reamer is a device for reaming out and truing up the main bearings and connecting rod bearings of motor cars. It is claimed that with it all the connecting rod and main bearings in a car can be fitted up in an hour. To operate the bearings are screwed down astride the reamer, which is the same size as the crankshaft, and the device is adjusted by two set screws threaded through the bottom plate under the box journals at each end of the reamer, where two gages are provided to show the exact adjustment made. By this adjustment it is possible to raise the reamer up to any height desired, as the raising and lowering of the reamer shows on the gages. To ream and true the main bearings, bolt the reamer to the cylinder block and adjust the reamer to the bearings and turn it by the crank. Owing to the condition of the metal market, prices are quoted on demand.—Lee's Universal Reamer Mfg. Co., Paducah, Ky.

Safety Signal Semaphore

The Safety Signal semaphore is a combination of taillight, license plate attachment and semaphore signal to signal the driver's intentions to the rear. It is simple and strong in construction and presents a neat appearance. The device is attached to the rear of the car and controlled electrically from the steering column. It can be controlled from the dash if desired and attached to the rear fender also. The controlling device has three small colored lamps, indicating to the driver the position of the signal when set. The semaphore is in red with a black enamel case. All the wires are incased in a single cable attached to the battery in such a way as to be switched to the magneto. The operating power is conducted to the semaphore by two solenoids. The round bull's eye is red and is operated as the ordinary taillight, reflecting a white light on the license plate. The parallelogram just above the bull's eye is green and comes on as a caution light. The semaphore swings to the right for a right turn and to the left for a left turn.—Safety Signal Corp., Galesburg, Ill.

Dual Cooling System

The Dual cooling system consists of a centrifugal-force circulating pump with a capacity that will not allow the water to remain in the cylinder block long enough to come to the boiling point, it is claimed, and a large ball-bearing fan that supplies air to carry away the heat from the radiator. The pump swings on the water line, which gives proper adjustment to both fan and pump belts at all times. There are separate adjustments for each, which are taken up automatically by the spring belt tighteners. When further belt adjustments are necessary, they can be made without the use of wrenches. A 1½-in. belt from the lagged



Improved Cell-Beam spotlight, left, and Dual cooling system installed

crankshaft pulley to the pump pulley and a 1-in. belt from the pump pulley to the fan are used. The pulley on the fan has a diameter of 2½ in., which gives ample belt surface and reduces slippage of the belt to a minimum, it is said. By removing the pump and fan belts from the pump pulleys, the pump body can be swung out of the way, so that it does not interfere with any work on the engine. No drilling or tapping is required for installation, which can be made in about 30 min. Dual Mfg. Co., 1202 Hennepin avenue, Minneapolis, Minn.

Boe Barrel Attachment

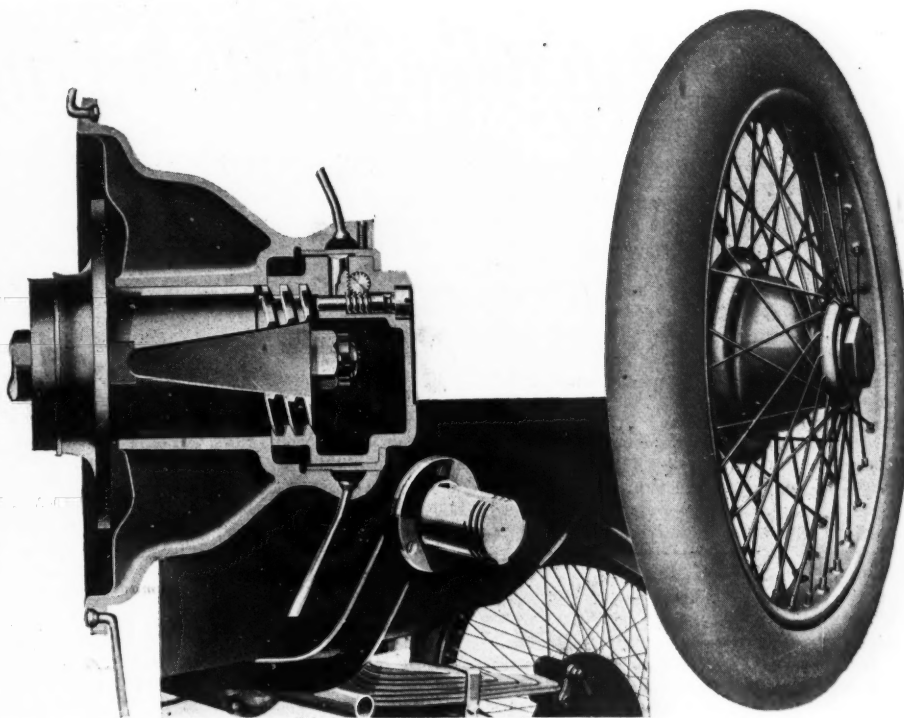
The new Boe barrel attachment for handling semi-fluid oil consists of a 30 by 7 4-gal. self-measuring tank and extra heavy truck with two 5-in. front wheels and double rear caster. The truck principle is somewhat similar to the barrel attachment oil pump with the exception of the new device air charge which is first applied to the original barrel as attached to the truck and then air pressure again is used for discharging the contents of the self-measuring tank to the point of use. The air pressure left in the self-measuring tank, when it has been emptied, can be used for charging the barrel, which in turn will fill the self-measuring tank when air is allowed to escape from it. A combination barrel attachment for handling transmission oil also is made. It is similar to the other outfit except that it has extra heavy reinforcing steel plates for the barrel heads, an extra heavy 30-lb. self-measuring air pressure tank, special large intake valve and pipes, automatic stop for refilling self-measuring tanks and measures automatically into as well as out of tank. Price, for transmission oil, \$45; for semi-fluid oil, \$30.—H. M. Boe Co., 2416 University avenue, southeast, Minneapolis, Minn.

Bul-Zi Nut

The Bul-Zi nut is a device to hold the horn button of a Ford car in the center of the steering wheel, where it can be reached instantly. Price, 25 cents.—Bul-Zi Nut Mfg. Co., Sunny Slope station, Kansas City, Mo.

Kol-Ben Wheel

A distinctive feature of the Kol-Ben wire wheel is the double lock, one of which locks the other. A quarter turn of the light wrench operates the lock and forces the wheel on or off. To prevent sticking or binding of the wheel on the hub the



Kol-Ben wheel, showing at left hub construction, and, center, extra wheel carrier

parts that slide are self-oiled. No extra pressure is required to take off or put on the wheel, and the operation of adjusting or removing can be done in 6 sec. The hub is of a heavy casting capable of resisting tremendous blows. Sixty-four large, specially designed spokes are used, and the makers claim that there are four more than in any other wheel of the same size. Provision is made to take up the wear caused by the constant starting and stopping of a car. Taking up the wear prevents the

click sometimes heard in the hub. Unusual care is taken in finishing. All the parts are rendered rust-proof by the Wise electric sheradizing process, after which they are put through a series of baths to free them from foreign matter. A coat of rust-proofing enamel then is applied. The primer and enamel coats follow, and in the process each wheel is baked three times. A well-constructed spare wheel carrier for either side or rear is made also.—Kol-Ben Wheel Co., Inc., Detroit.

MOTOR CAR REPAIR SHOP—ADJUSTING GEARS

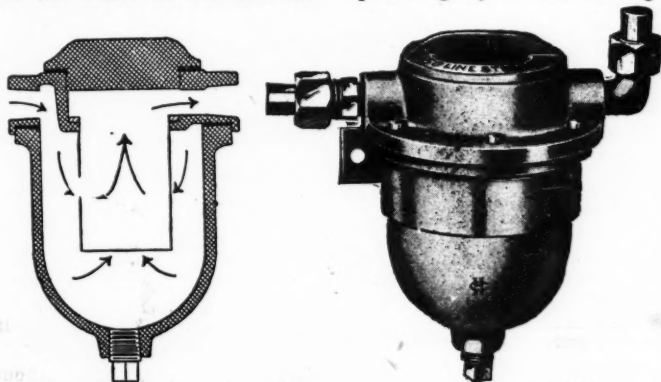
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has been removed, examine the gears. See that back face or heel of teeth on both pinion and ring gear are flush, as shown. End play in pinion shaft bearings is removed by nuts with locker washer at forward end of pinion shaft. The end play must be eliminated before the pinion is adjusted. Loosen the lock nut by turning to left when facing axle from front end. When this is released the inner nut either can be loosened, if there is lack of end play, or tightened, if end play is apparent. Care always should be exercised not to take up too tightly on the bearing adjustment.

Just enough to eliminate end play but not so as to cramp or bind. The shaft must turn freely. When this result is obtained, tighten all the nuts, turning to the right. The pinion adjustment can be reached by removing the adjustment lock on the right side of the differential carrier after the two cap screws, holding the lock, have been removed.

The pinion bearing mounting is slotted, and by the use of the tool which fits these slots it can be moved either in or out. If the pinion is to be meshed deeper in the ring gear, turn the adjustment up or downward to withdraw. If the pinion is not flush with the ring gear or there is too much or too little lash between the teeth, the ring gear may be adjusted either in or out, to remedy this condition. The adjustment of the ring gear should be made as follows:

Remove the differential cover plate on the rear axle housing. Take off the adjusting nut locks located at either side of the differential and held in place by fillister-head. To move the gear toward the right back off the right adjusting nut 1 or 2 in. at a time and take up on the left nut the same number. Of if the gear should go to the left, reverse the action. Take the side play out of the differential bearings with these adjusting nuts.



Holtzer-Cabot gasoline strainer, with cross-sectional drawing

Among the Makers and Dealers

KNIGHT Tire Increases Its Output—The Knight Tire & Rubber Co., Canton, Ohio, has increased its output from 200 to 760 tires per day.

Bessemer Truck Has New Building—The Bessemer Motor Truck Co., Grove City, Pa., will move to an \$80,000 building at Holmsburg, Philadelphia, Pa., as soon as it is completed.

Wurl Is Remy Sales Engineer—Frank L. Wurl has been made sales engineer of the Remy Electric Co., located at Detroit. He came to the Remy company a few years ago as electrical engineer, where he was head of the research laboratories.

Moore Heads New York White—William H. Moore, formerly manager of the White Co. branch at Pittsburgh, Pa., has succeeded R. H. Johnston as manager of the New York branch. Mr. Johnston, as previously announced, has been assigned to special executive work with headquarters in Washington.

Bound Brook Oil-less Insures Employees—The Bound Brook Oil-less Bearing Co., Bound Brook, N. J., has made arrangements whereby every employee who has been in the service of the company for three months is insured to the amount of \$500, increasing with the length of service. The entire expense of the policy is paid by the company.

Bellevue Organizes for War Strength—About fifteen dealers and garage owners met July 23 to organize the Bellevue Automobile Trade Association at Bellevue, Ohio. Every dealer in the city was present except two who sent proxies. Louis Jacobs was elected president; C. B. Royer, vice-president, and George Klein, secretary-treasurer. Steps were taken to affiliate with the Ohio Automobile Trade Association. A resolution was adopted to close all garages on Sundays and holidays. Two of the garages also handle implements, but no exception was made in their cases.

Prohibition Brings Increased Efficiency—According to the Employers' Association several hundred skilled and unskilled workmen left Detroit for Ohio and other nearby industrial centers still tolerating the sale of liquor, but a great many were attracted to the city by what they believe to be more ideal working conditions. This influx practically offset the loss due to prohibition. One outstanding benefit of prohibition among Detroit industries has been the increase in production of Government work that it has made possible. Formerly workmen addicted to intoxicants worked only part time, especially around pay days. Now these men are enabled not only to put in full time but considerable overtime as

well, and the quality of the work is improved in some cases from 50 to 75 per cent. Much credit is given prohibition for the remarkable reduction in annual labor turn-over.

Whittaker Is Assistant to Conlon—Donald F. Whittaker, advertising manager of the Aca-son Motor Truck Co., Detroit, has also become assistant to H. A. Conlon, vice-president of the company, in charge of sales.

Clive Now with Vim Truck—Hamilton Clive, until recently sales manager for the Federal Motor Truck Co. of St. Louis, Mo., has resigned to become district sales manager for the Vim Motor Truck Co. of Philadelphia, Pa., in Oklahoma, Texas and Missouri.

Teetor-Hartley Gets War Order—The Teetor-Hartley Motor Corp., Hagerstown, Ind., has been awarded a contract for the manufacture of exhaust manifolds to be used on the new engines to be installed in the Liberty tanks. The first order calls for the construction of 1500 manifolds.

Grant Declares Quarterly Dividend—The Grant Motor Car Corp., Cleveland, Ohio, has declared its regular quarterly 1½ per cent dividend on preferred stock, payable Aug. 1. The company has removed its home transfer office from Chicago to Cleveland, and the Guardian Savings & Trust Co. is transfer agent.

Ohio County Trade Organizes—More than 75 per cent of the dealers, garagemen and accessory dealers in Logan County, Ohio, have met and organized the Logan County Automobile Trade Association. A resolution was adopted to comply with the recommendations with reference to closing and conservation. George W. Conley was elected president and H. S. Whitney secretary. Another meeting will be held soon when a committee will report on the attitude of the dealers who did not attend the meeting. Victor Moon, manager of the Ohio Automobile Trade Association, was present and aided in forming the organization.

Foundrymen to Hold Meeting—The week of Oct. 7-12 will witness the largest assemblage of iron, steel and brass foundrymen, engineers and superintendents that has ever gathered anywhere at one time. The occasion is the annual convention of the American Foundrymen's Association and five allied organizations, which will meet in Milwaukee, Wis., and is expected to attract not less than 4,000 visitors. The congress was held in Boston, Mass., in 1917. The Milwaukee Auditorium will be used for the annual exposition, requiring 100,000 sq. ft. or more of floor space. It will be the first time that every

branch of the foundry trade in the United States will gather for simultaneous deliberation of the problems injected into the industry by the war.

Detroit Weatherproof Doing War Work—The Detroit Weatherproof Body Co., Detroit, has shifted over a large part of its plant from the manufacture of limousine tops to metal stampings for the War Department.

Motors Metal Adds to Plant—The Motors Metal Mfg. Co., Detroit, is erecting two large additions to its plant to take care of a large order from the Government for metal parts to be used on ambulances. One building is 60 by 200; the other 60 by 50.

Dixon Heads Standard Bearing Branch—C. O. Dixon, for several years with the motor accessory department of the Shapleigh Hardware Co., St. Louis, Mo., has been named manager of the newly-opened branch of the Standard Roller Bearing Co.

Scharon Now with Hyatt—William A. Scharon, who was connected with the advertising department of the Packard Motor Car Co. and the Timken-Detroit Axle Co., has become advertising manager of the tractor bearings division of the Hyatt Roller Bearing Co., Detroit.

Batchelder with Olds Motor Works—C. F. Batchelder, for the last two years assistant sales manager of the Dort Motor Car Co. and for ten years previously sales manager of the John Deere Plow Co., St. Louis, Mo., has been made eastern division sales manager of the Olds Motor Works, Lansing, Mich. He succeeds N. W. Barton, who has been transferred to New York with the Oldsmobile Co. of New York.

Horizontal Hydraulic Purchases Young Patent—The Horizontal Hydraulic Hoist Co., Milwaukee, Wis., has purchased the business of the Young Patent Hoist Co. and under similar management, but with increased capital and manufacturing facilities will continue the production of horizontal hydraulic hoists and dump bodies on a more extensive scale than heretofore.

Janesville Machine Elects Officers—The Janesville Machine Co., Janesville, Wis., which July 1 passed into the control of the General Motors Corp., has elected permanent officers as follows: President and general manager, J. A. Craig; vice-president, H. L. Barton; secretary-treasurer, T. S. Merrill. Mr. Craig was general manager of the Janesville company under the former ownership. The capital stock of the company has been increased from \$750,000 to \$2,250,000. The implement plant is now being improved and



TRACTOR DEMONSTRATES AT SPEEDWAY RACE—E. A. Mitchel, Fordson distributor for the state of Washington, put on a tractor demonstration at Tacoma during the recent speedway races, and here is shown the tractor in line with the racing cars



WOMEN DRIVE CARS AT BUICK PLANT—The Buick Motor Co. employs women to drive cars from the assembling plant to the loading platform and states that the plan is working out excellently. Fourteen women are being used for this purpose and their duties are confined merely to the driving of cars. Besides the driving from the assembling plant the women drive the cars also from the warehouse to the company's garage to be delivered to dealers who come to drive cars away

enlarged and ground is now being broken for the new tractor works, which will occupy a tract of 125 acres. The Samsón Sieve-Grip tractor will be manufactured.

Delling Is Stanley Chief Engineer—E. H. Delling has been appointed chief engineer of the Stanley Motor Carriage Co., Newton, Mass. He succeeds C. E. Broad, who has resigned.

National Tractor General Offices—The National Tractor Co., which succeeds the Denning Tractor Co., Cedar Rapids, Iowa, has located its general offices at Cedar Rapids and will handle sales matter direct from there. The export sales offices are located in New York.

Williams Foundry Elects Officers—The Williams Foundry & Machine Co. has elected the following officers: President and general manager, F. E. Holcomb; vice-president, S. F. Zilliox; secretary and treasurer, William Leary. A five-story building, 275 by 40 ft., has been added and is devoted exclusively to the manufacture of Akron-Williams tire repair equipment.

More Dealers and Repairmen Unite—An enthusiastic meeting of dealers and garagemen was held at Upper Sandusky, Ohio, July 22, when the Wyandotte County Automobile Trade Association was organized with a membership of more than a score. Practically every dealer and repairman in the county attended. W. J. Dupont was elected president; William H. Phelps, vice-president; J. B. Johnson, secretary, and Charles H. Johnson, treasurer.

Goodrich Purchases Resort for Employees—The B. F. Goodrich Rubber Co. has purchased a large tract of land near Akron, Ohio, including Rex Lake, for a recreation center in addition to the athletic field maintained by the company. A summer cottage has been erected on the grounds where employees may spend week-ends and their vacations. A bathing pier and beaches have been provided; also boats for fishing, basketball and tennis courts and free transportation between Akron and the lake, a distance of nine miles.

Transport Truck to Start Production—The newly-formed Transport Truck Co., Mount Pleasant, Mich., will start the manufacture of its internal gear-driven trucks immediately. While the new factory will probably not be finished for ninety days or more, construction of 1½- and 2-ton models will begin at another factory, with an output which will probably reach four or five a day by Sept. 1, it is expected. The following officers have been elected: President and director of sales,

M. A. Holmes; first vice-president and chairman of board of directors, H. E. Chatterton; vice-president and treasurer, A. E. Gorham; secretary, W. D. Hood.

Conklin Becomes Remy Electric Manager—O. F. Conklin, chief engineer of the Remy Electric Co., has been made general manager. G. V. McMahan, sales manager of the motor equipment division, has been appointed assistant general manager.

Joliet Opens Ohio Distributing Office—The Joliet Oil Tractor Co., Joliet, Ill., maker of the Bates Steel Mule tractor, has opened a distribution office in Cleveland, Ohio, the Bates Steel Mule Co. of Ohio. A branch is to be opened at Columbus soon.

Service Truck Adds Buildings—The Service Motor Truck Co., Wabash, Ind., has let a contract for two new buildings whose floor space will aggregate all the floor space of the buildings already built and occupied by the company. The contract is for a new power house and a two-story structure to be 775 ft. long and 75 ft. wide. The estimated cost of the two structures is \$125,000.

Clyde, Ohio, Trade Gets Together—The Clyde Automobile Trade Association, Clyde, Ohio, was organized at an enthusiastic meeting of dealers, repairmen and garage owners July 24. The organization will affiliate with the state organization. The officers are: I. J. Jordon, president, and I. C. Weidle, secretary-treasurer. A strong resolution was adopted to close all dealers, garages and repair shops on Sundays and holidays.

East Leaves Factory for Agency—George L. East has resigned as assistant sales manager of the Olds Motor Works, Lansing, Mich., to become associated with the Gulf Oldsmobile Co., New Orleans, La., in the distribution of the Oldsmobile throughout Louisiana. His connection with the Olds company dates from 1907 and includes five years as advertising manager, several years as wholesale representative and one and one-half years as assistant sales manager.

Inter-City Trucking Service in Operation—The Inter-City Trucking Service, Inc., Detroit, is operating daily express service between Detroit and Flint and intermediate points. The company sends out trucks from Detroit and Flint every morning, Sundays excepted, picking up and delivering freight on the route between the two cities. Centrally located receiving stations are maintained in the larger towns, where shippers may send consignments at any time. Connections with other motor delivery companies in the state enable the Inter-City company to receive

freight and guarantee prompt delivery to many points in Michigan not covered by its own route.

Beckenbach in Ordnance Service Now—Homer Beckenbach, formerly assistant sales manager of the Cleveland branch of Willys-Overland, has entered the service as inspector in the drop-forging department of the Ordnance Department in Detroit.

Fremont, Ohio, Dealers Organize—An enthusiastic meeting of several scores of dealers and garagemen Monday evening, July 15, resulted in the formation of the Fremont Automobile Trade Association. The organization was immediately affiliated with the state association. Fred Durwald was elected president and L. G. Post secretary. The dealers in Fremont will confer with those in Clyde and Bellevue with regard to following the federal plan for closing and conservation. Practically all the dealers of Fremont are heartily in favor of the move.

Acme Truck Adds to Personnel—The Acme Motor Truck Co. has made several additions to its sales organization. G. M. Rockwell, formerly associated with the Republic Motor Truck Co., has been appointed district manager and special representative of the Acme Motor Truck Co., Cadillac, Mich., in charge of Virginia, Maryland, Delaware and North Carolina territory. J. A. Bell has been appointed district manager of the Gulf states east of Texas. F. P. Walker, formerly associated with the Hupp Motor Car Corp., will have charge of Acme sales in Nebraska and the western half of Iowa.

Birmingham Trade Gets Together—The Birmingham Motor Trades Association, Birmingham, Ala., has been organized with Ted Brownell president. The organization meeting was attended by representatives from practically every agency and accessories establishment in the city. The other officers are Hubert Drennen, vice-president; D. K. Napp, treasurer. The office of secretary of the new association will be filled by the board of directors at a later meeting. It is proposed that the duties of the secretary will include the operation of an information bureau and the promoters of the new association are anxious to obtain the services of a man who is thoroughly conversant with the industry and the condition of highways and tourist travel in that section of the Southeast. Firms dealing in tires, batteries, painting or accessories of any kind are being solicited to join the new organization. Following the election of a secretary the organization will begin active work in support of good road projects and will co-operate with the Birmingham chamber of commerce in bringing tourists to this section.

From the Four Winds



A DOUBLE LOAD ON ORPHANS' DAY—When the Chicago dealers and owners held their annual Orphans' Day Herman J. Staebler, Reo distributor, donated this ambulance and seven-passenger. They were well used, too

SOLDIERS and Sailors Ride There—The Tri-City Automobile Trade Association, Davenport, Iowa, is distributing among the car owners windshield stickers inviting soldiers and sailors to "salute and ride."

Traffic League to Meet at Buffalo—The National Industrial Traffic League has changed the time and place for its summer meeting to Buffalo, N. Y., Aug. 29-30. Convention headquarters will be at the Hotel Lafayette.

From Mexico to Western Canada—A. H. E. Beckett recently made the trip from Juarez, Mexico, to Calgary, Alberta, in a Dord, at 23.06 m.p.g. of gasoline for the greater part of the distance between Juarez and Denver, though the hard going after that reduced the mileage to 17.09. The trip was 2,505 miles long.

Canadian Registrations Show Increase—As illustrating the ratio of increase in the registration of motor vehicles of all kinds in Ontario, the last year shows a total of 83,799 passenger and commercial cars as against 54,375 in the previous year, an increase for the twelve months of more than 50 per cent. Motor cars were first licensed in Ontario in 1903, when 220 vehicles were registered. Up to and including 1917 the registration advanced to 83,799 vehicles and it is expected that despite the war the close of the present year will see the 100,000 total far exceeded. In 1903 not one car was owned by a farmer. To-day the farmer car-owners of Ontario number 23,409, and lead by more than 50 per cent the merchants, manufacturers and other classes.

Jersey Motorists Protect Strangers—Claiming that the wholesale arrest and fining of Pennsylvania motorists, who have wholly disregarded New Jersey's laws against glaring headlights, gives their town a bad reputation, residents of several towns along the seashore routes have been making it difficult for state inspectors to operate. When about fifty motorists were stopped at Audubon on the Atlantic City road, the mayor refused the inspectors the use of the city hall and the wife of the only justice in the town would not let him hold court in the house. When

the inspectors and the 'squire finally improvised a court in a cellar and lined up the drivers for trial, local residents and even the town constable went up and down the road warning other motorists to keep away from the town. The fight between inspectors and townspeople on seashore routes is waxing warm and both sides threaten reprisals.

State Fair to Include Motor Car Show—Detroit dealers have purchased sufficient space this year to warrant the Michigan state fair putting on its annual motor car show this fall. Secretary-Manager G. W. Dickinson announced that the show would be one of the features and will occupy the first floor of the Automobile building. The second floor of the building has been taken over by the Government for a display of war materials, trophies from the European battlefields and other exhibits that are of interest to the general public.

Milwaukee Plans for Fall Show—Frank J. Edwards, head of the Kissel Kar Co. and the Edwards Motor Car Co., Milwaukee, Wis., has been appointed chairman of the show committee of the Milwaukee Automobile Dealers, Inc., to take charge of the annual fall show to be held in conjunction with the Wisconsin state fair at Milwaukee, Sept. 9-14. Mr. Edwards will be assisted by Leslie D.

Frint, Oldsmobile; Alfred Reeke, Nash, and R. J. Healy, Westcott and Stanley. The active management of the show will be in charge of Bart J. Ruddle, assistant secretary and manager of the M. A. D. At the latest truck accessory and supply and tire divisions was considered, and a special committee was meeting of the association, the proposition of enlarging the scope of the body to include appointed to make further investigation of the feasibility of the plan and ways and means of carrying it out.

Club Gives Patriotic Prizes Only—The Automobile Club of Kansas City, Mo., is giving all prizes, except trophies already arranged for, in Liberty bonds this year.

Truck Serves Sweets to Soldiers—When the Taylor-Made Candy Co., Battle Creek, Mich., found its business outgrowing its delivery facilities on account of the demands at Camp Custer it looked around for motor equipment and found it in an Overland delivery car. The dealer made a demonstration in which the car made the round trip of about 10 miles each way, loaded and unloaded, in less than an hour.

Lexington Makes Quick Run—By making the run from Kingman, Ariz., to Los Angeles, Cal., 407 miles, in 11 hr. 46 min. on high gear a Lexington Minute Man six claims to have smashed all previous records for the drive. Harry Hunter of Phoenix, state representative in Arizona for Wisdom & Co., Lexington distributors, and J. E. Keller of the Arizona Engineering Co. drove. In addition to the two drivers and two observers there were 150 lbs. of baggage.

Trucks Transport Art Exhibit—The French Aerial warfare exhibit which is being shown in various cities of this country travels by motor. About eighteen months ago the Federal Motor Truck Co., Detroit, and its Russian representative, Plym & Ochs, New York and Petrograd, gave a 1½-ton truck to the Russian Red Cross to be used as an ambulance. It became impossible to transport the truck, however, and it was raffled off at a Russian bazaar, being repurchased by Mr. Ochs, who lent it to the Aero Club of America. The club is using the truck to transport the paintings by Lieutenant Farre, which already have been exhibited in New York, Pittsburgh, Detroit and Chicago.

Trucks Haul Hogs to Market—An increase of 180 per cent has been noted in the number of hogs transported to the Omaha market by motor trucks during the first six months of 1918, as compared with the corresponding period of 1917, an example of how motor trucks are relieving railroad transportation. The number carried in this way amounted to 92,780 for the period in 1918, as compared to 33,084 for the corresponding months last year. Estimating seventy hogs as an average carload in railroad shipments, the number delivered by motor trucks on the Omaha market during the first six months of 1918 aggregated more than 1300 carloads, or an average of more than eight carloads for every market day during the period. The motor truck business is becoming so important that commercial organizations of Omaha are taking active measures to utilize the trucks on return trips to country points for hauling various kinds of freight. Experience has shown that motor truck marketing is as feasible in winter as in other seasons, as more than 26,000 hogs were delivered directly from farms to the Omaha market during January and February.

Coming Motor Events

SHOWS AND DEMONSTRATIONS

- Sept. 2-7—Indianapolis, Ind.
- Sept. 8-14—Milwaukee, Wis.
- Sept. 14-21—Chicago, Automotive and Accessories Exposition.
- Oct. 14-27—Dallas, Tex.
- Oct. 28-Nov. 2—Chicago, N. A. A. J.



ROSS GEARS

Take My Place For Just One Day

"And you'll know, as I do, what it means to drive a truck equipped with a Ross Steering Gear. You can't tell much about it in a few minutes' trial—nor even in an hour or two. It's the long grind, morning to night, day in and day out, that tells the tale.

"I've driven a lot of trucks in my time—most of them good ones, too—well made and with good reputations. Some of them were hard to handle—just a constant strain all day long. Many a time I've gone home so dead tired that I was simply 'all in, down and out'.

"Then there were others so easy to handle that it was a pleasure to run them. There wasn't much difference in general construction, but I soon found that the trucks that were easiest to handle had a Ross Steering Gear. That one thing made all the difference.

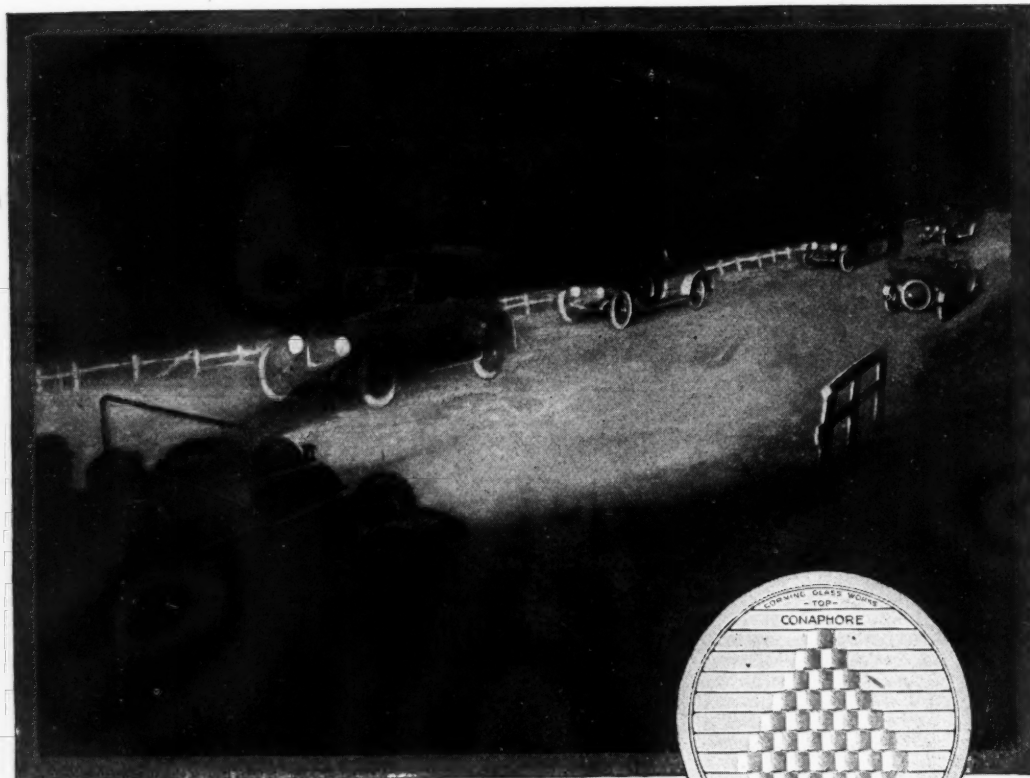
"Ross Gears have an unusually big bearing surface so that it is easy to steer the truck under all conditions. This gear is so well made and the material is so good that I always feel better with a Ross Steering Gear. It means safety and reliability, and the work is easier.

"The boss says I am doing more work with this Ross Steered truck—and I know I am—but it's a fact that I don't have to work so hard to do it. I'm satisfied, and since he has given me more money because of the work I am doing, the boss must be satisfied too."

Ross Gears are used as standard equipment by one hundred and fifteen manufacturers, representing considerably over half the motor truck industry. Write for catalog and any special information desired.

The Steering Gears
that
PREDOMINATE
on
Motor Trucks

ROSS GEAR & TOOL COMPANY
400 Heath Street, Lafayette, Indiana



These cars are equipped with Noviol Conaphores. The soft, mellow light cannot dazzle or confuse. Each driver knows that chances of accident are reduced to the minimum.

The Conaphore has a smooth front surface. Easily cleaned. Does not clog with dust or mud.

Photograph
by
L. A. Hiller

Cash in on these exclusive features

Five sales points which mean profits to you

1. Noviol Conaphores, with their unique yellow tint, flash a sure signal of safety to oncoming motorists—

2. They provide a light that is always easy on the driver's eyes—

3. They define a clear path for the driver when wet pavements reflect a glassy glare from street lamps and electric signs—

4. They cause the greens of the roadside to stand out in their natural colors, and show up the ditches—

5. Most important of all, they eliminate the dangerous "back-glare" which blurs the driver's vision on foggy or dusty nights.

Only in the Conaphore can motorists get these extra advantages.

A product of technical research

Noviol Glass and Conaphore design were developed in the Corning laboratories, which lead the world in the art of glass making. Conaphores bring safety and comfort on the highways, just as Corning signal glass protects every great railroad of the continent.

As the famous double target test proves conclusively, Conaphore design keeps the beam below the 42-

inch level, and yet gives the longest possible range—500 feet—with ample sidelight. No light is wasted by diffusion. No light is dumped in the foreground.

Take advantage of the market

Supply the demand for Conaphores in your territory. Let your customers know that your store is Conaphore headquarters and you are bound to get some extra profits.

Write for handsome Conaphore window transparency—all ready to mail you. It ties up your store with our big national advertising campaign.

Retail Price List (per pair)		Noviol Glass	Clear Glass
5	to 6 7/8 inches incl.	\$2.40	\$1.60
7	to 8 1/2 inches incl.	3.50	2.50
8 3/4	to 10 inches incl.	4.50	3.00
10 3/8	to 11 1/2 inches incl.	6.00	4.00

Prices 25c more per pair west of Rocky Mountains
Sizes vary by steps of 1/8 inch above 6 1/2 inch size

CONAPHORE SALES DIVISION
EDWARD A. CASSIDY Co., Mgrs.
Madison Ave. and 40th Street, New York City

NO GLARE
RANGE 500 FT.

CONAPHORE

PIERCES FOG
AND DUST

CORNING GLASS WORKS—WORLD'S LARGEST MANUFACTURERS OF TECHNICAL GLASS

When Writing to Advertisers, Please Mention Motor Age.

TRIANGLE TRUCKS

Add Them to Your Line of Passenger Cars



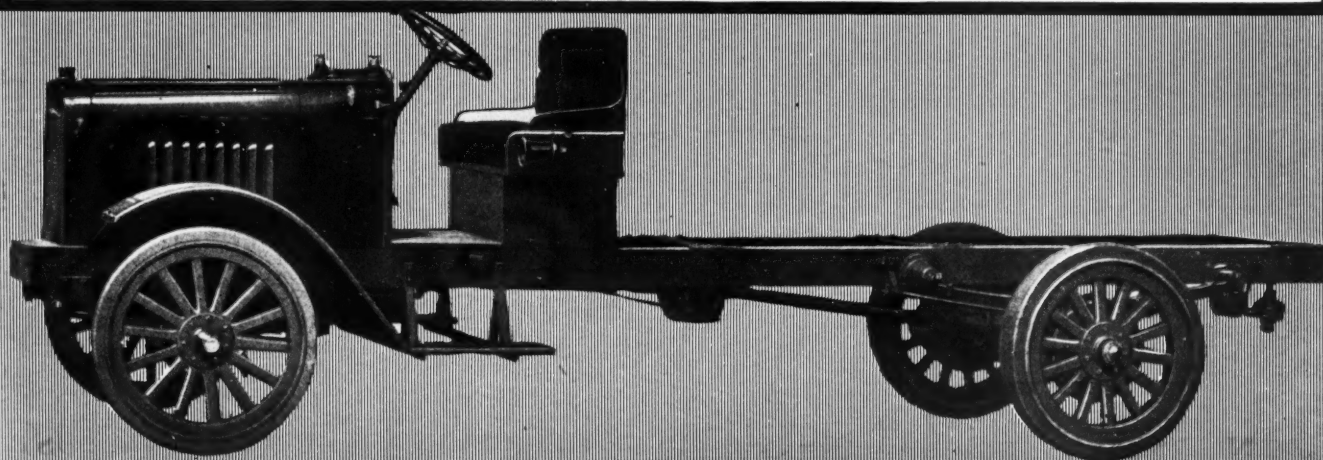
Passenger car production may be further curtailed. Cars may be harder to get later on than even now. Add Triangle Trucks to your present line as business strategy. Divide your overhead. You can sell Triangle Trucks. There will be twice as many trucks sold this year as were last. We can make immediate deliveries on the 1½ ton model—deliveries on the 2½, 3½ and 5-ton models will follow later.

SPECIFICATIONS—Waukesha Motor, Eisemann Magneto, Stromberg Carburetor, Fuller Transmission, Universal Drive Shaft, Celfor Internal Gear Rear Axle, Torbenson Front Axle, Detroit Bronze-Bushed Springs, Gemmer Steering Gear. Wheelbase, 144 inches—Turning radius, 23 ft. 6 in.—Tread, 56 inches—Clearance, front 9½ inches, rear 12¼ inches—Tires, front 34x3½, rear 34x6.

WIRE OR WRITE FOR PRICES, COMPLETE SPECIFICATIONS AND DEALER'S PROPOSITION.

TRIANGLE MOTOR TRUCK CO.
St. Johns, Michigan

Eastern Representatives: Triangle Motor Sales Co., 381 Fourth Ave., New York City, N. Y.





Serving National Needs —and Trade Needs

Your policy and our own, places government requirements ahead of all other demands.

National needs come first and must be served first.

Following these requirements, we are doing

and shall do everything in our power to make our great resources and facilities count to the utmost in serving those who look to us for their trade needs.

National needs first, then trade needs with like energy.

The Standard Parts Company, Executive Offices, Cleveland, Ohio

Standard Parts for Motor Cars, Trucks, Tractors, Airplanes Motorcycles and Other Vehicles

Axles
Axles (dead rear)
Axles, trailer
Bock Bearings
Hubs
Perfection Springs
(regular and thin leaf)
Perfection Heaters
Stanweld Rims
and tubing

Rims—clincher detach-
able and demount-
able for single and
dual equipment
Clincher Rims
Detachable Rims for
Wire Wheels, special
Millimeter Rims, all
types
Rim Tools
Flanges and Fittings
Solid Tire Demount-
able equipment

Other Stanweld Products

Tire Bases in Demount-
able and pressed on
Channels
Brake Rod Assemblies,
complete
Starting Cranks
Electric Welding of
Parts
Exhaust Tubes
Bands S. A. E.
Formed Tubing
Forging for Convertible
Trucks
Ignition Wiring Tubes

Lamp Brackets
Mast Sleeves
Oil Tubes
Radiator Rods
Starting Gear Rings
and Boxes
Straight Steel Tubing
Steering Gear Tubing
Tail Pipes
Torsion Tubes
Truss Rods
Tubing (straight and
formed)

PERFECTION HEATERS

Heaters a Trade Need to be Anticipated

This year, Perfection Heaters will be more in demand than ever before—with output restricted by existing conditions.

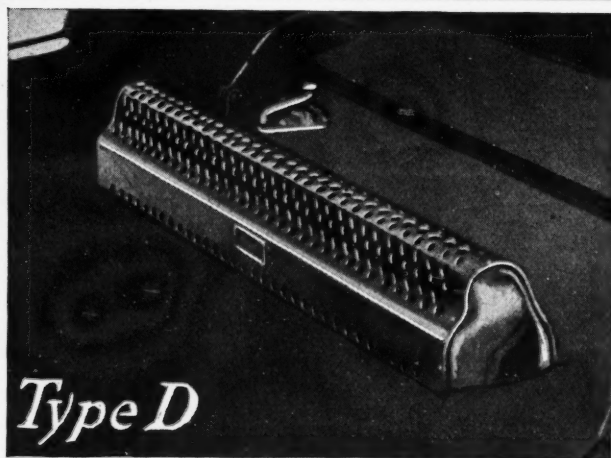
Jobbers should anticipate their requirements and order now.

Motor car dealers also

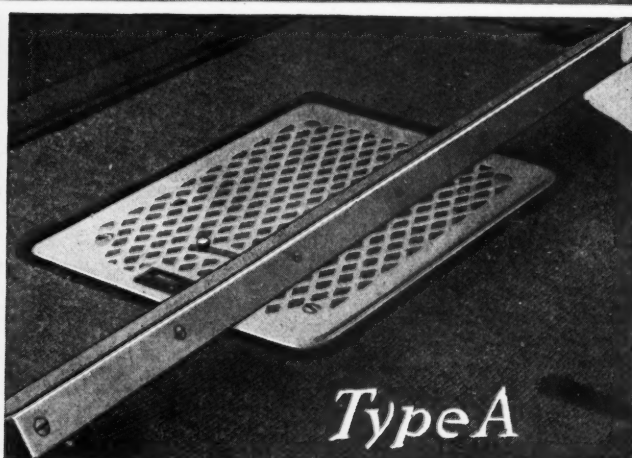
would do well to order now, have Heaters ready to install on new cars—to compete with the twenty-four makes of cars now factory equipped with Perfection Heaters.

Garagemen will feel increased demand for Heaters for cars already in use.

The Standard Parts Company, Perfection Heater Div'n, Cleveland, Ohio



Type D

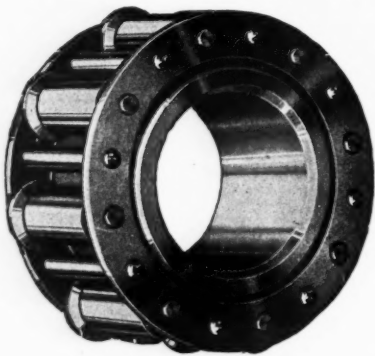


Type A



Tolerance

The fine accuracy of Bower Roller Bearings is produced by skilled workmen operating specially designed machines and checked by instruments of scientific precision. These bearings are adjusted radially at the factory once for all. Because of the length of the roller and its large diameter, wear is infinitesimal. Consequently, the initial accuracy of Bower Bearings need not be disturbed, and is maintained through years of hard service.



BOWER

ROLLER BEARING CO.
Detroit Michigan



Ever-Tyte

THE
PISTON RING
THAT STOPS 90% OF
MOTOR TROUBLES

Every Day in Every Man's Town

Garageman: - - "What's the trouble?"

Motorist: - - "Motor missing—no power—spark plugs full of oil."

Garageman: - - "You need new piston rings. They'll stop the oil from fouling your spark plugs, and give much greater compression. Save you gas and oil, too."

Motorist: - - "What kind of rings would you suggest?"

Garageman: - - "I recommend the Ever-Tyte Piston Ring to all my customers. It's the only piston ring that's really practical. It gives you real power and certainly puts an end to gas and oil wastage. You can't go wrong on Ever-Tyte, because it's guaranteed to give satisfaction or money refunded."

Ask any engineer about Ever-Tyte's 3-Point Radial Expansion.

The EVER TIGHT PISTON RING Co.
1604 Kingsland Ave. :: :: :: Saint Louis, Mo.

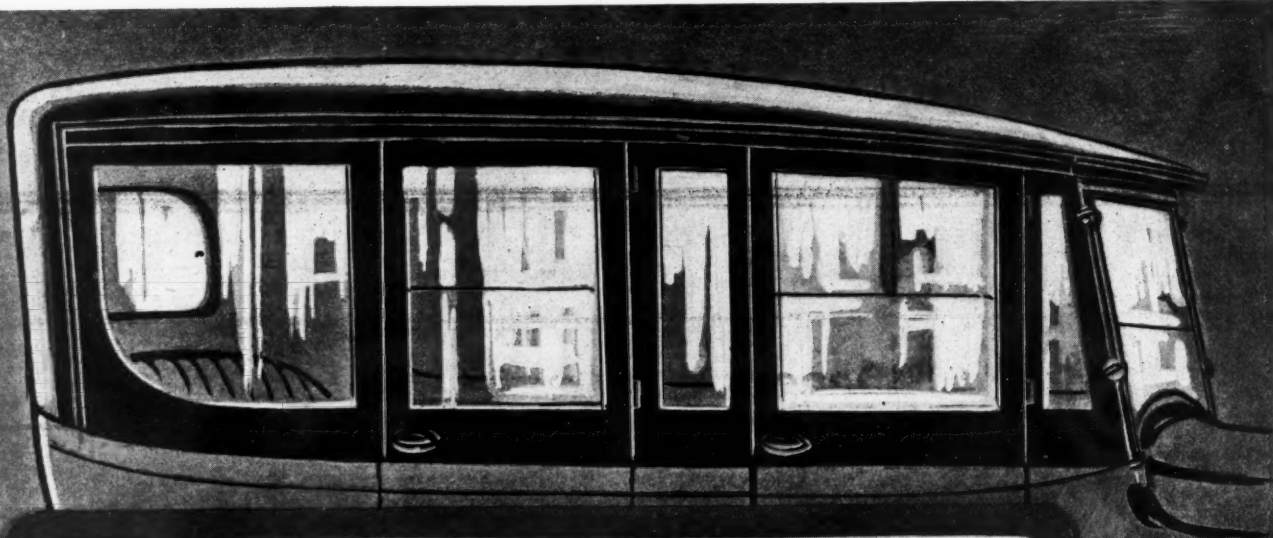
FREE "The Piston Ring Primer"—full of interesting and valuable piston ring information that every Car Owner and Garage man should have. Write for your copy today.

**TIME TESTED—
SIX YEARS!**



National Ad. No. 116

B19



This Top Adds 7 Months to the Motoring Year

More Business for Dealers—More Pleasure for Car Owners

These beautiful Anchor Tops sell on sight. They offer the car dealer the soundest opportunity that exists for keeping his business going at full speed and earning extra profits.

Car owners, more and more, are learning to use their cars all year 'round. And the Anchor Top gives an open car more real style and comfort than it had even when new.

Every owner of an open model Buick, Ford, Oldsmobile, Overland, Oakland or Dodge, is a prospect.

The time to buy and the time to sell is early this year for two reasons: First, because shipping conditions may make it impossible for you to get tops when you want them later.

Second, because the increasing demand for Anchor Tops promises soon to exceed our supply.

Dealers who contract for their needs at

this time will be taken care of throughout the season. Don't delay.

No Trouble to Install

Anchor Tops fit on the regular body irons of a car and can easily be installed without expert knowledge. No rattling, no squeaking, no overhanging. 30 years of fine coach building

stand back of the practicability and beauty of Anchor Tops. They transform the open car into a luxurious Sedan or Coupe, elegantly appointed, strongly constructed and charming in outline and design.

They are light weight, glass enclosed and give snug comfort and protection against cold, wet and snowy weather.

Let us remind you—mail the coupon in the corner at once for photo designs, prices and full information.

*Sedan
Anchor Top
Coupe
Glass-Enclosed*

The Anchor Top & Body Co., 732-B South St., Cincinnati, O.

Fine Coach Builders for 30 Years

(32)

THE
ANCHOR
TOP &
BODY CO.
732-B South St.
Cincinnati, Ohio

Send photo-designs,
prices and full details
on Anchor Tops.

Cars owned or handled.....

Name.....

Dealer ☐ Owner ☐

Address.....

When Writing to Advertisers, Please Mention Motor Age

Heavy Duty Motor Trucks Prove Covert Dependability

The perfect design—perfect workmanship of Covert Transmissions manifests itself in the heavy duty motor truck.

Here Covert durability—Covert overstrength—mark it as a transmission designed to bear the strains and stresses of severe service.

No matter how heavy the load—how rough the road bed—Covert Transmissions quietly and unfailingly deliver each revolution of the powerful motor to the rear axle.

Covert dependability under all conditions is the reason why the owners of Covert equipped trucks are so enthusiastic over Covert.

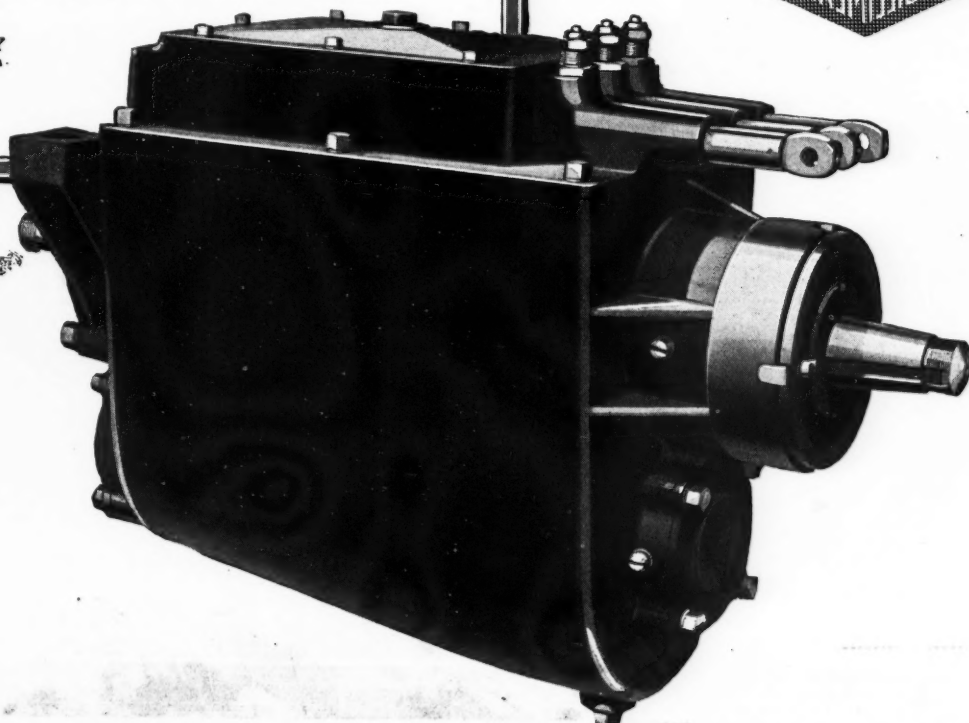
Covert Gear Company, Inc.

Sales, Engineering and Service

967 Woodward Ave.

Detroit, Mich.

Factories:
Lockport, N. Y.
Detroit, Mich.



When Writing to Advertisers, Please Mention Motor Age.

MUNGER

"Always Tight" Piston Rings

**Give more power
Save gasoline
Save oil
Stop plugs fouling
Stop engine smoking**



The MUNGER "Always Tight"
PISTON RING OUTFIT
8 Regular Size Rings 1 Regrooving Tool
4 Over-width Rings 1 Ring Insertion Tool

You will see the difference almost immediately.

Within thirty minutes after you start your engine Munger "Always Tight" Piston Rings will seat themselves perfectly. (The little oil grooves do it.) And once seated, waste and other troubles resulting from compression losses are forever ended.

These rings remain *permanently gaslight* because the patent process of peening them makes them conform to the shape of any cylinder (even though worn out-of-true), and the "Always Tight" Expansion Joint compensates for all wear as it occurs without leaving any opening through which gas can escape.

Being made in one piece, they are not susceptible to the ailments of more complicated rings.

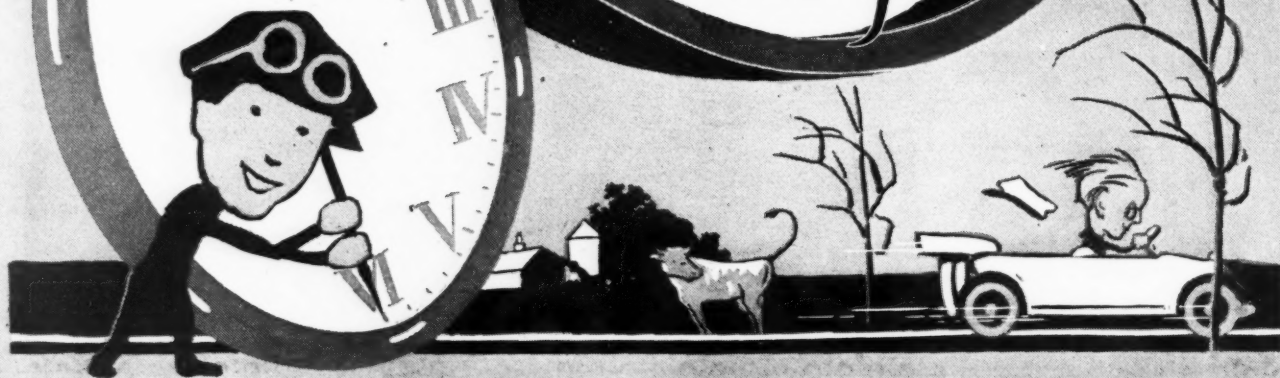
Try them! If they do not fulfill all our promises—if they do not do all that is claimed for other rings—if for any reason they do not give you satisfaction, return them within thirty days to the dealer from whom you got them, and he will gladly give you your money back.

SPLITDORF ELECTRICAL CO., Newark, N. J.

Splitdorf Branch Houses and Service Stations:

Atlanta, 10-12 E. Harris St.	Minneapolis, 816 Hennepin Ave.
Boston, 68 Brookline Ave.	Newark, 278 Halsey St.
Chicago, 2613 S. Michigan Ave.	New York, 7 W. 61st St.
Dallas, 402 S. Ervay St.	Philadelphia, 210 N. 13th St.
Detroit, 1295 Woodward Ave.	Pittsburgh, 5943 Ellsworth Ave.
Kansas City, 1827 Grand Ave.	San Francisco, 1022 Geary St.
Los Angeles, 1215 S. Hope St.	Seattle, 1628 Broadway
	Toronto, 469 Yonge St.

30 minutes' after you start using them



When Writing to Advertisers, Please Mention Motor Age.

NORWALK

*There's a Jones in Every
Town and a Smith
That Gets His Goat*

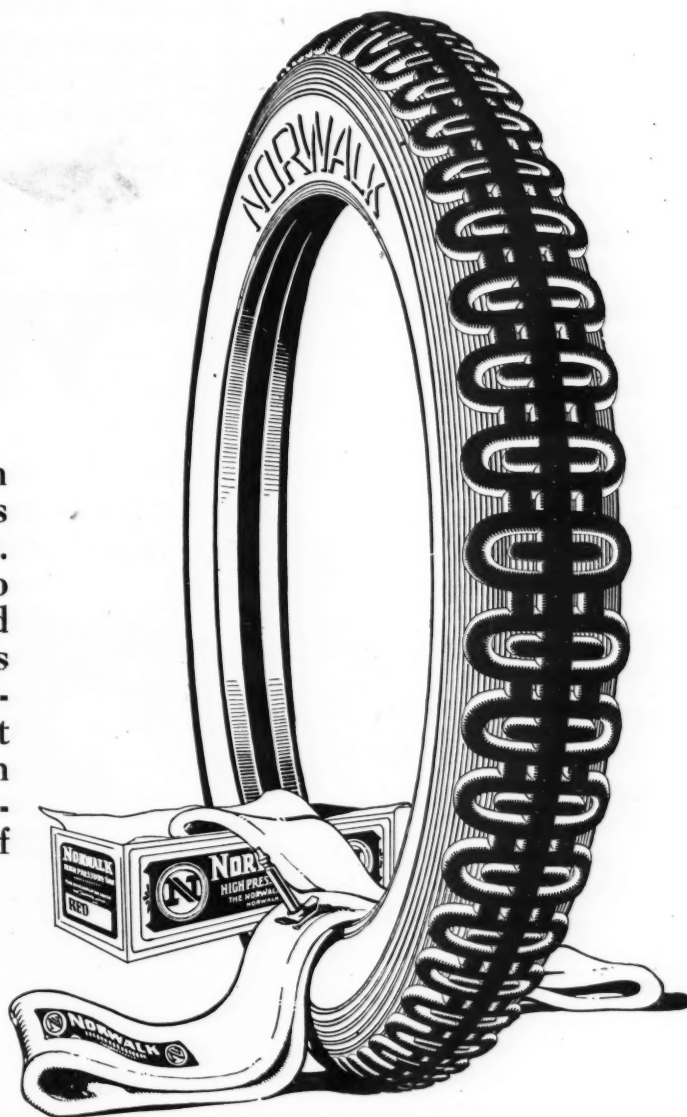
Jones listens to the noise.

Smith bites the rubber and cuts it with his scissors—stretches it in a way that tries its soul, and if it doesn't come up to Norwalk standards, hands it back to the salesman without comment, but in a way that shows the interview is finished, and no return dates open.

Norwalks are built by men who have always built tires since tires were first built. They made up their mind to make the best casings and tubes that can be made. Lots of men have had that resolution, but best materials aren't enough. See what Paquin makes out of silk and compare it with the product of the village dressmaker!

It costs less to be Smith than it does to be Jones. Smith has nothing to do over, and he makes money from the start, and his resales are absolutely painless. Smith and Norwalk and Paquin are three of a kind.

NORWALK TIRE & RUBBER CO.
NORWALK, CONN.



HIGH PRESSURE
CASINGS AND TUBES.

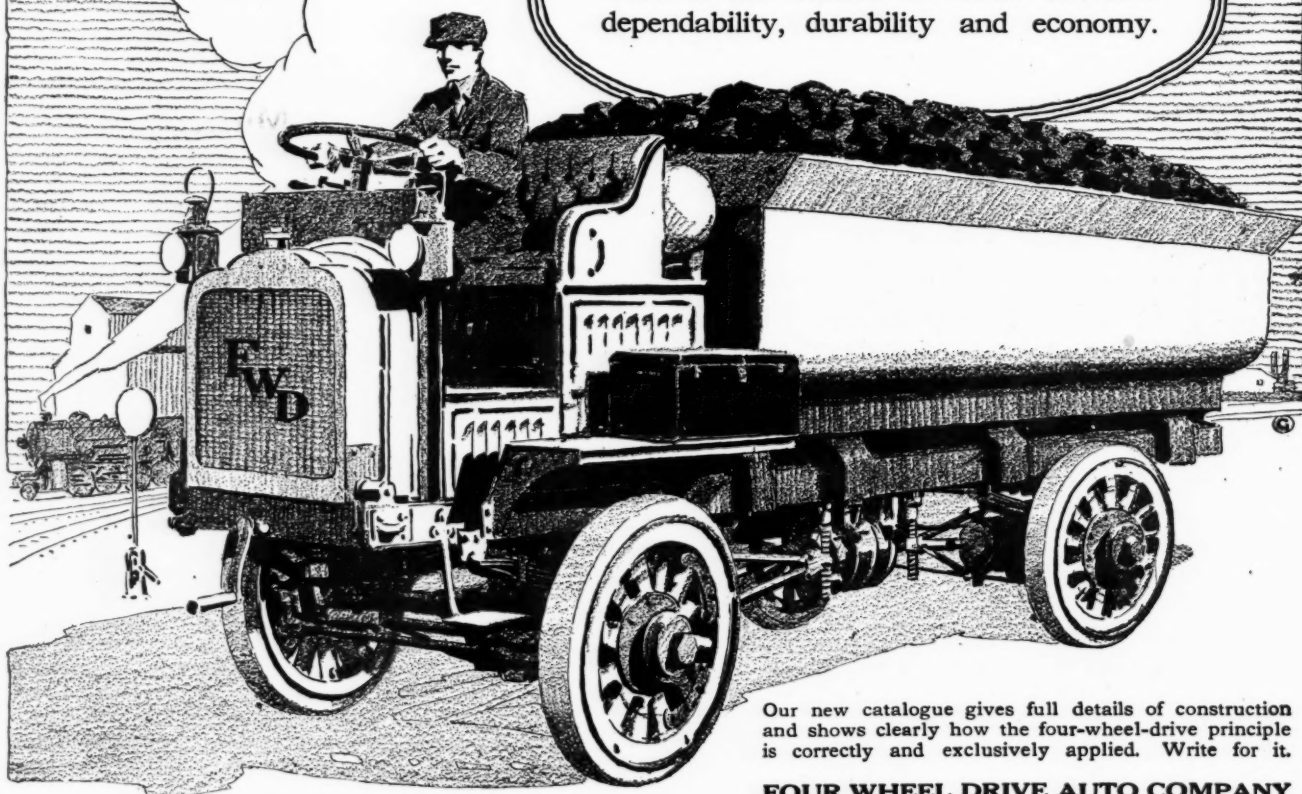
Power

THE tremendous reserve of power, sufficient to master any emergency under maximum load, whether on smooth, slippery pavement or rough country road, is due to our correct and exclusive application of the four-wheel-drive principle.

Every wheel is a driving wheel in

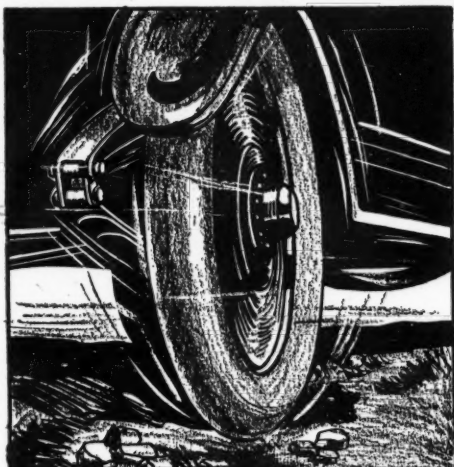
FWD Trucks

That is one reason for their extreme dependability, durability and economy.

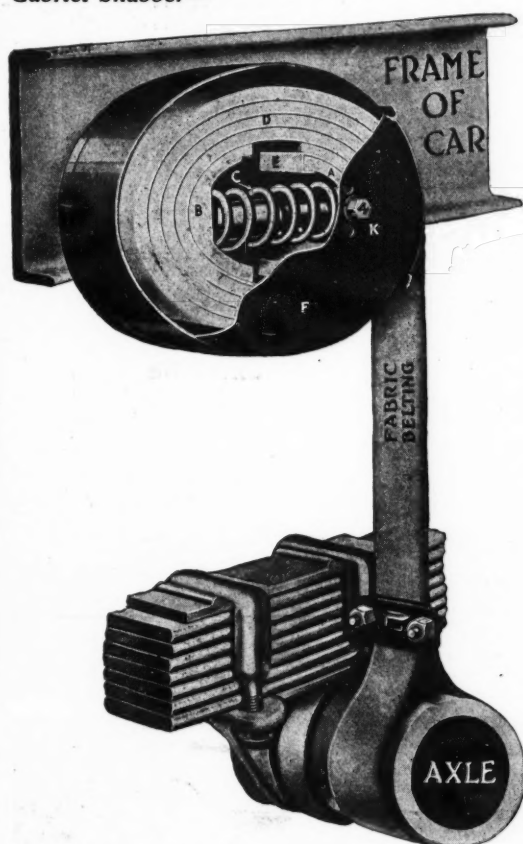


Our new catalogue gives full details of construction and shows clearly how the four-wheel-drive principle is correctly and exclusively applied. Write for it.

FOUR WHEEL DRIVE AUTO COMPANY
Department L Clintonville, Wisconsin



Continual rebounding of the Springs jolts the car unless prevented by the Coils in the Gabriel Snubber—



—just as easily and surely as the Bull is held by the Coils around the tree.



War-Time Essentials:

Keep Fit

Make your car ride easy and quiet, and yield the utmost comfort and recreation, so vital to war-time fitness.

Cut Down Repair Expense

It's the quick rebound that shakes things loose; stop it with Snubbers and save both time and money now wasted in unnecessary mechanical repairs.

Save on Tires and Springs

By keeping wheels from bouncing up and down over rough places, Snubbers take the strain off tires—and prevent spring breakage.

New Cars Will Be Hard to Get— Save Your Old One

It's neither Time nor Mileage, but *Rough Riding* that wears out your car. Keep your present car riding easy and quiet with Snubbers and you won't be tempted to buy a new one.

AMERICA'S FOREMOST CARS USE GABRIEL
SNUBBERS AS STANDARD FACTORY
EQUIPMENT

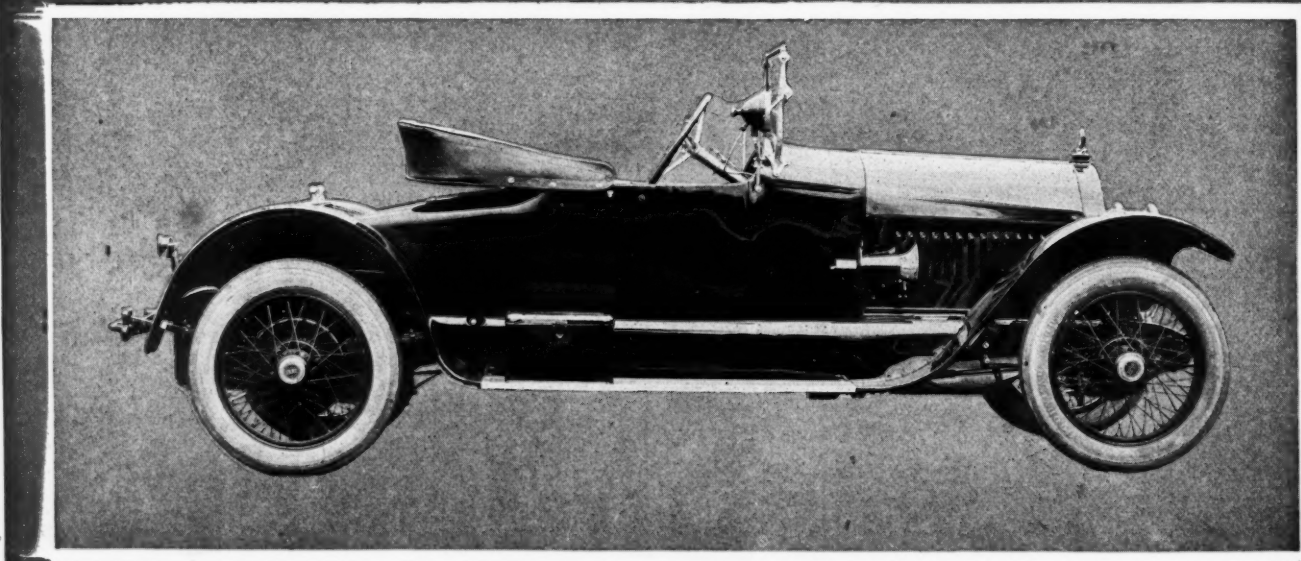
GABRIEL MFG. COMPANY

1415 EAST 40th STREET,

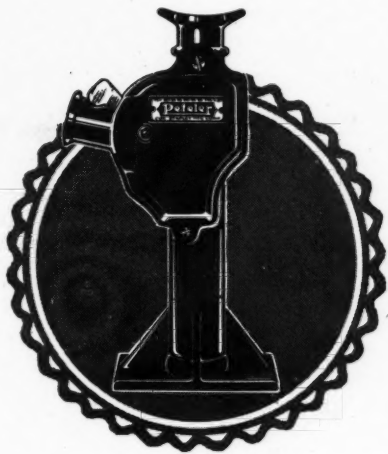
CLEVELAND, OHIO

Price: \$18, \$24, \$30 per set of Four, ready to attach

GABRIEL SNUBBERS



When Writing to Advertisers, Please Mention Motor Age.



Peteler AUTO JACK

Makes the most substantial selling appeal of all the jacks on the market. Properly displayed, it will be your best, though silent, salesman, Mr. Dealer.

With the easily-operated extension handle of the Peteler Jack it becomes unnecessary to sprawl under the car or in the roadway to get the jack into play. Slipped under the axle and withdrawn without soiling the hands or clothing.



CLASS in automobile accessories is reflected from three angles—the merit of the product, the novelty of its mechanism and its appearance.

The merit of the Peteler Jack is beyond all argument. Peteler Jacks won a place for themselves that was unassailable even before the present model was introduced. This jack is supreme from the point of view of performance. It is *over-strength*—3,000 pounds capacity. It is built for work *first*. Its broad base, its substantial proportions, all mean *business*.

It is designed to lift any passenger car easily, surely, safely, without any inconvenience to the operator. It fulfills this purpose with a big margin to spare.

Its mechanism is novel, yet practical in the last degree. Its high-carbon steel lifting bar operates on a short stroke, making easy lifting, raising rapidly at the rate of $\frac{3}{8}$ of an inch per stroke. It would be hard to imagine an easier-operating jack.

In reversing, the load comes down just as easily, and when the weight is off the jack the lifting bar drops into the casing, and the jack is withdrawn, all without the possibility of danger.

Its appearance is appropriate to its high quality. Staunch and well-proportioned, it is handsome in outline and the highly glazed black enamel finish makes it a very attractive display piece. Put a Peteler Jack on your counter. It will sell itself.

Thus the three requirements of fine merchandise are satisfied by the Peteler Jack.

It is deserving of a particular selling effort by every dealer—and it will give every dealer the substantial reward of real profit and rapid turnover.

\$6 For the
Best Jack
in the World

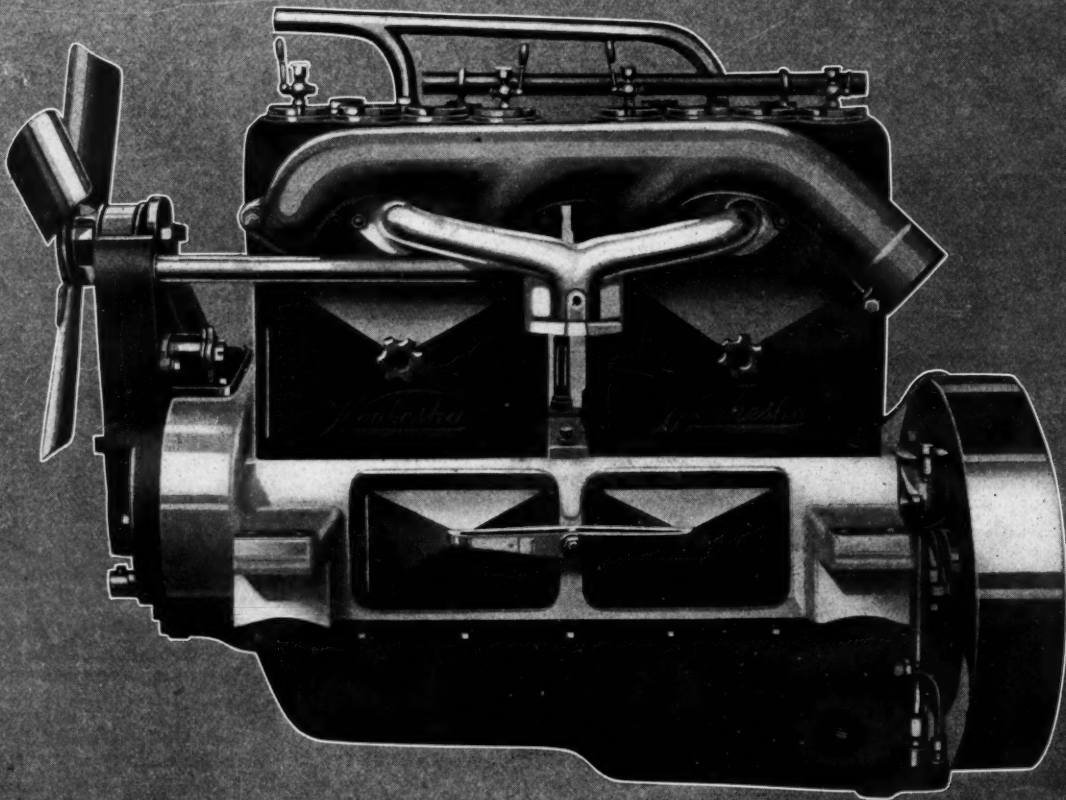
Special Proposition for Jobbers and Dealers. Write for it.

COE-STAPLEY MFG. CORPORATION

Factories: Bridgeport, Conn.

Executive Offices: 135 Broadway, New York

COE-STAPLEY



Priorities to the Nation

With a true American desire to do well those things apportioned as their part, the producers of

Waukesha
TRADE MARK

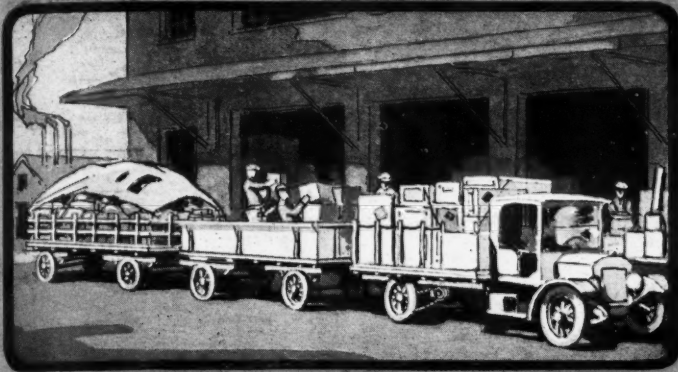
Four-Cylinder Motors for Trucks and Tractors

promptly diverted their resources in men and machinery to fabricating the implements of War. Even tho facilities and production have increased twenty-fold since the direct and undirect demands of war came, the output still remains inadequate to meet the needs of all. Your patience therefore, will be appreciated while still further efforts are made to meet the demand for Waukesha Motors.

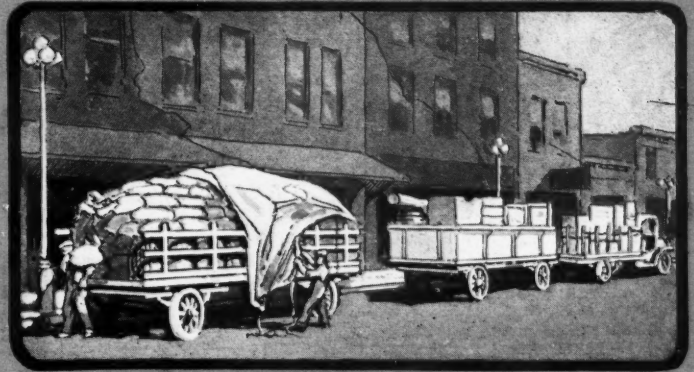
WAUKESHA MOTOR CO., Waukesha, Wis.

World's Largest Builders of Truck and Tractor Motors Exclusively

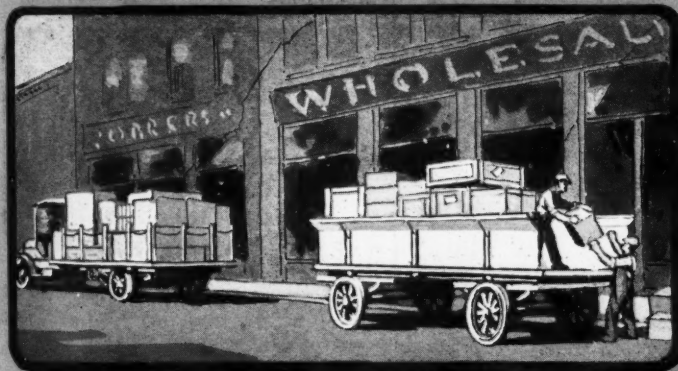
100% TRANSPORTATION NO IDLE TIME



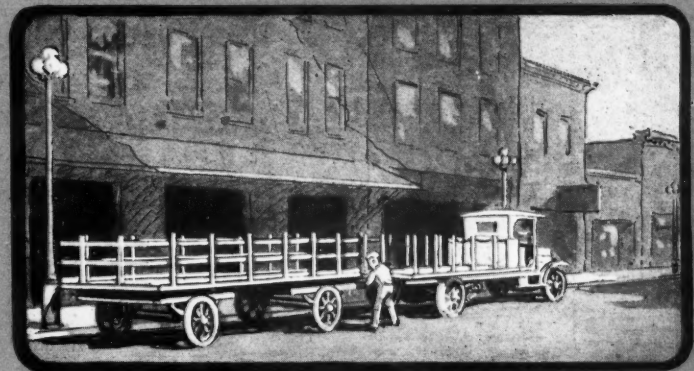
Redden Perfected Universal and Trailers at home factory loading—



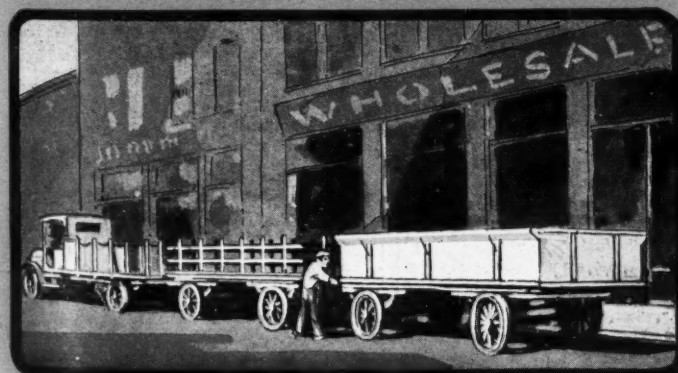
Detaches loaded Redden Trailer No. 2 at first customer's receiving platform—



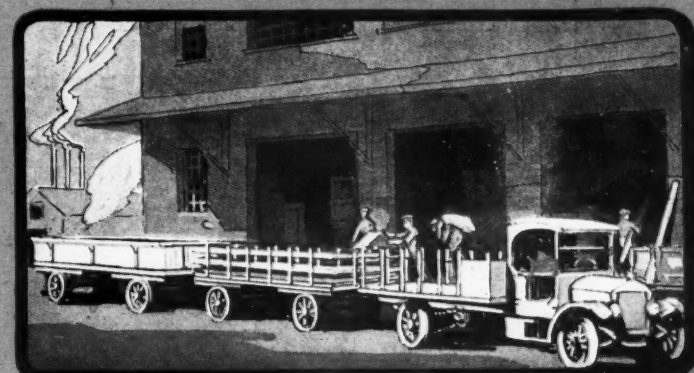
Detaches second loaded Redden Trailer No. 1 at the next customer's receiving platform—



The Redden Perfected Universal has unloaded at last customer's platform and on way back picks up Trailer No. 2 empty—



Proceeds to where he left Trailer No. 1 to be unloaded, and picks it up empty—



And arrives at home factory with empties—reloads Redden Perfected Universal and attaches two loaded Redden Trailers.

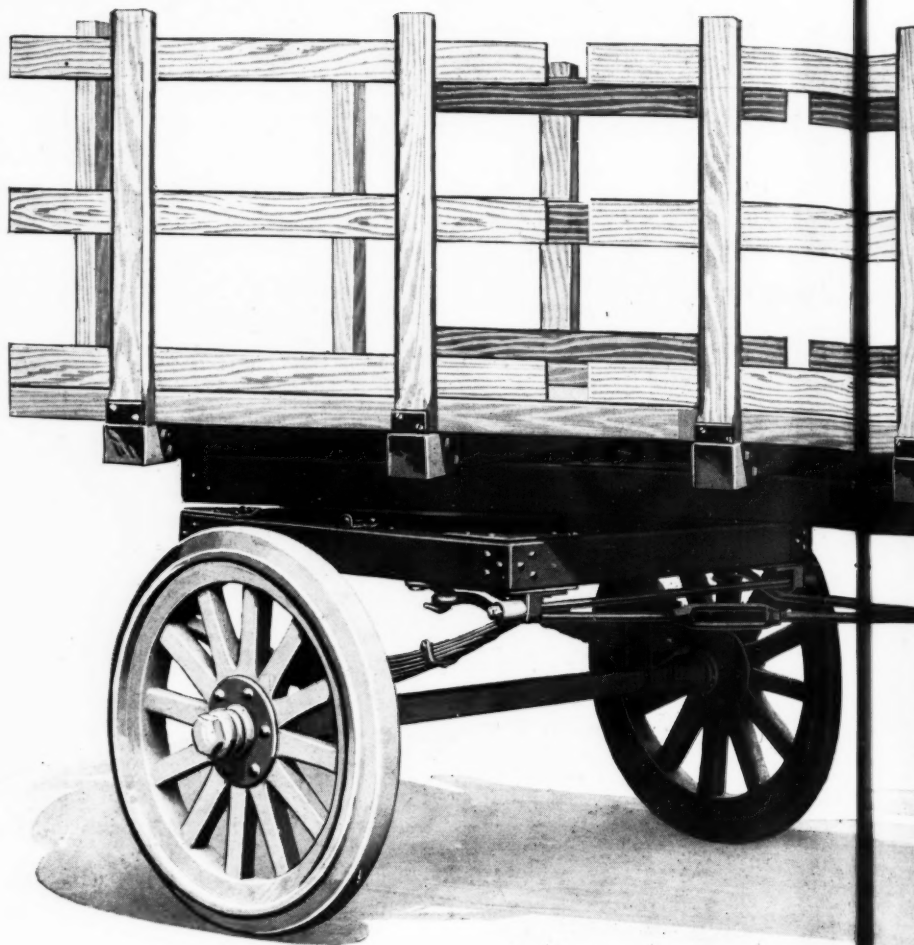
REDDEN

Complete Line for Dealers

The Redden Trailer

Profit Possibilities

The sales for Redden Trailers are limited *only* by the number of men who have trucks in your vicinity and those who are going to buy trucks, as well as dealers in light delivery trucks, because every owner and every prospective owner of a motor truck is a prospective purchaser for one or more Trailers if shown the advantages of this equipment.



THE REDDEN COMPLETE LINE

The Redden *Perfected* Universal Truck Maker
The Redden Trailer The Redden Ford Truck Maker

The Redden Line offers wonderful sales possibilities.

Redden Trailers cut hauling costs and make big slashes into maintenance costs.

Where hauling is increasing, but not sufficient to warrant additional trucks, there is a prospect for Trailer sales.

The Trailer saves money, time, labor, insurance, gasoline, oil, repairs, etc., and increases hauling efficiency.

It can be handled by the same men who handle the truck.

One motor truck can pull both loads.

The Trailer can be loaded and unloaded while the truck is making other deliveries.

REDDEN MOTOR TRUCK CO., Inc.
2337 S. Michigan Avenue CHICAGO, ILL.

Wire or Write—or come to Chicago

Tracks Perfectly



Message to Dealers

Important to all Dealers who have difficulty in obtaining passenger cars.

If you are not already from 25% to 40% short on passenger cars, you will be very soon. You should fill the gap with the REDDEN COMPLETE

LINE. In this advertisement is told how the Redden Complete Line overcomes hauling problems and makes great slashes in delivery costs.

Redden Trailers require no special care.

Trucks now idle for hours waiting for goods to be loaded and unloaded can be kept in constant use.

Eight hours' service in an eight hour day with the use of Trailers.

The Redden Trailer is of a two-ton capacity, steers and tracks perfectly, and in every sense of the word performs the dual purposes of a truck and the saving of expenses in its operation.

WRITE FOR OUR DEALER PROPOSITION

There is a great and growing demand for the Redden Complete Line because it is 100% transportation.

You can make big money by handling the Redden Line.

We are spending thousands of dollars in a smashing national advertising campaign that is making money for our dealers, and is bringing us a large number of inquiries. You should send in your inquiry at once.

REDDEN MOTOR TRUCK CO., Inc.

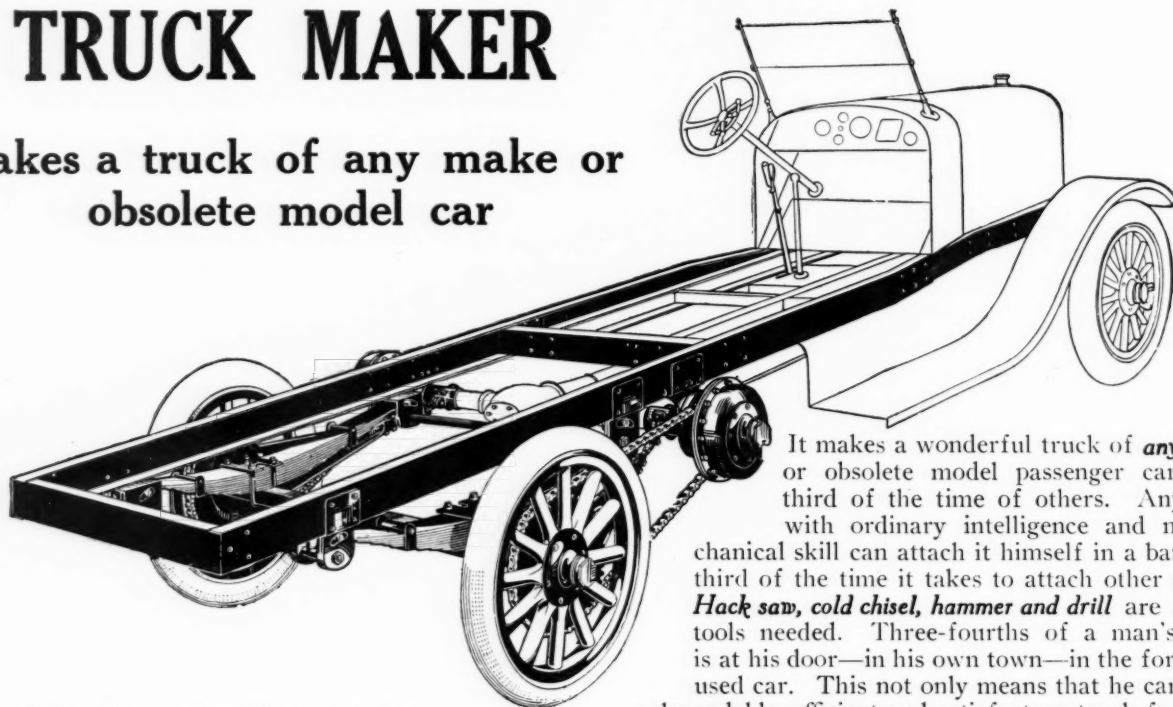
2337 S. Michigan Avenue

CHICAGO, ILL.

Wire or Write—or come to Chicago

REDDEN *PERFECTED* UNIVERSAL TRUCK MAKER

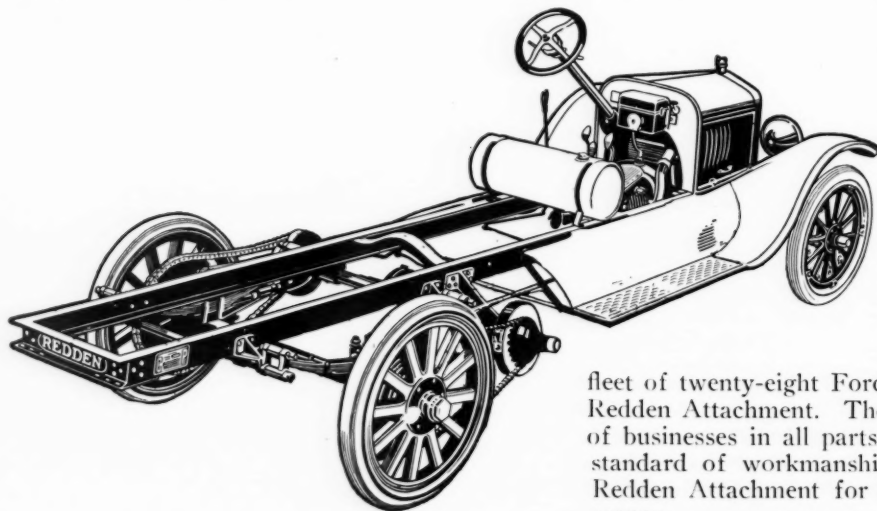
makes a truck of any make or obsolete model car



The limitations of utility and the weaknesses of construction in other truck makers are entirely overcome in this ingenious attachment. That's why it's called the *perfected*.

It makes a wonderful truck of *any* make or obsolete model passenger car in a third of the time of others. Any man with ordinary intelligence and no mechanical skill can attach it himself in a barn in a third of the time it takes to attach other makes. *Hack saw, cold chisel, hammer and drill* are all the tools needed. Three-fourths of a man's truck is at his door—in his own town—in the form of a used car. This not only means that he can make a dependable, efficient and satisfactory truck from any make or model car with the Redden *Perfected* Universal attachment, but saves him hundreds of dollars! It also means conservation of freight car space for Uncle Sam and saves shipping costs and delay.

THE REDDEN ATTACHMENT FOR FORD CARS



The design and construction of the Redden Attachment for making trucks out of Ford Cars are *right*.

Many of America's biggest industries have fleets of Trucks made with the aid of the Redden Attachment. For instance—Armour & Company, packers; Coca Cola; Francis H. Leggett, foods; Great Western Oil Company; Barrett Manufacturing Company, roofing.

One great Canadian store has a fleet of twenty-eight Ford Trucks made from this high-grade Redden Attachment. Thousands are in daily use in all kinds of businesses in all parts of America. Considering the high standard of workmanship, design and quality materials the Redden Attachment for Fords offers supreme value for the money.

REDDEN MOTOR TRUCK COMPANY, Inc.

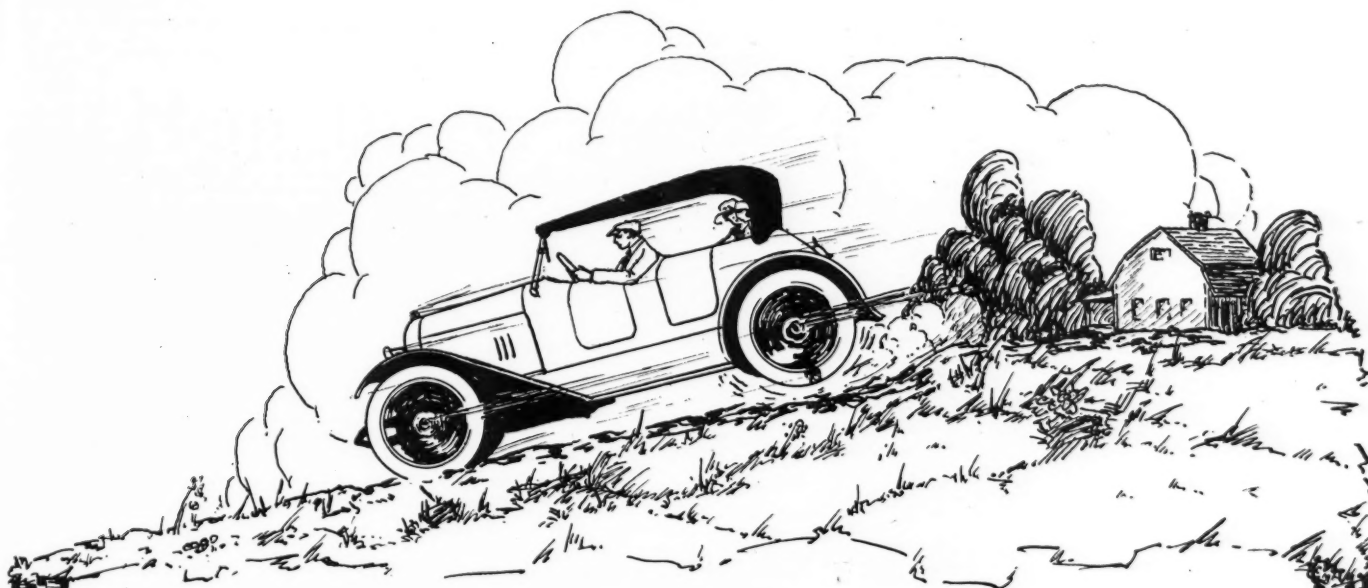
2337 South Michigan Avenue, Chicago, Illinois, U. S. A.

NEW YORK OFFICE
Redden Motor Truck Co., Inc.
224 West 57th Street
New York City

PACIFIC COAST
Redden Pacific Co.
1608 L. C. Smith Bldg.
Seattle, Wash.

WESTERN CANADA
Western Canada Auto Tractor Co., Ltd.
315 Hammond Bldg.
Moose Jaw, Sask.

Wire or Write—or come to Chicago



TAKE THE BUMPS WITH EASE

Never mind how rough the road or how many jogs and jolts are in every mile—if your car is equipped with S. & S. Shock Absorbers you can forget the bumps and ruts. They will never exist as far as your riding comfort is concerned.

Your car will hug the road instead of doing a series of plunges and bounces every time a bump is passed. You will never know the increased riding comfort that is in your car until you see what S. & S. Shock Absorbers will do.

The Most Practical Shock Absorbers for Large Cars

They have roller bearings which adjust the load to the spring.

They absorb all shocks and rebounds by flexing the ends of the springs.

They have a resiliency that prevents the break-

ing of springs.

They are light and durable. No springs to weaken or break.

No working parts to get out of order. Not cumbersome or unsightly.

NOW READY FOR THESE CARS

DODGE
MAXWELL
STUDEBAKER
HUPMOBILE
OAKLAND

BUICK 4
CHALMERS
CHANDLER
COLE
HUDSON

OLDSMOBILE
REO
KISSEL KAR

GLIDE
MOON
VELIE

DEALERS!

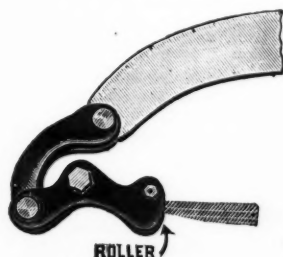
We guarantee the S. & S. Shock Absorbers to be free from all mechanical defects, and to give perfect satisfaction. If the user is dissatisfied after 30 days' trial from date of purchase for any cause whatsoever, he may return the Shock Absorbers and the purchase price will be refunded. There is no red tape about this guarantee.

Write for details
of our proposition

Starkweather - Snook Corp.
FORT MADISON, IOWA

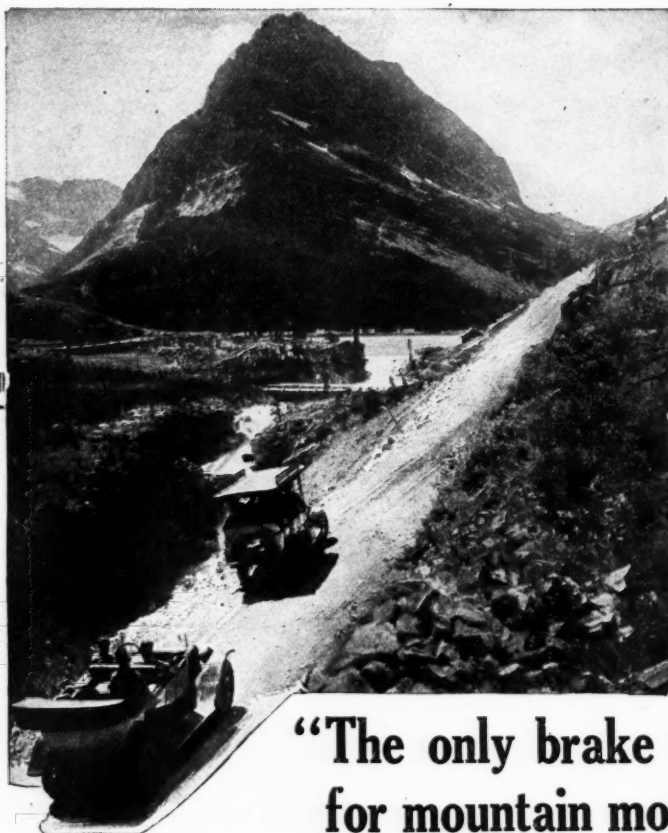


SHOCK ABSORBER



ROLLER

During both upward and downward movements of spring the body weight causes a pressure at the roller bearing (see cut above). This makes both movements more gradual, lessens vibrations and absorbs the shock by flexing the ends of the spring.



Where a slip
means death,
too much atten-
tion cannot be
given to the
brakes

"The only brake lining for mountain motoring"

OUT in the Glacier National Park in Montana they have been up against the brake lining problem. Thirty "White" busses weighing $3\frac{1}{2}$ tons are used to carry passengers up and down the mountains over grades that average 15% for 55 miles.

The Glacier Park Transportation Company appreciated the need of good brake lining where a single slip might mean death. So they experimented with various kinds.

Finally they standardized on Thermoid Brake Lining and wrote us "that it is the only lining to use for mountain motoring."

The brake lining that makes good on mountain roads and in every emergency will make good for your customers.

Why Thermoid makes good
Thermoid Brake Lining will give your

customers long certain service for three reasons.

1—There is over 40% more material and 60% more labor used in Thermoid than in any woven brake lining.

2—Thermoid is Grapnalized, an exclusive process which resists moisture, oil and gasoline.

3—Thermoid is hydraulic compressed under 2000 lbs. of pressure per square inch. This makes Thermoid uniformly hard all the way through.

Send today for information about Thermoid Hydraulic Compressed Brake Lining and how we help you build a profitable relining business.

At speed of	A car should stop in
10 miles per hr.	9.2 ft.
15 " " "	20.8 "
20 " " "	37 "
25 " " "	58 "
30 " " "	83.3 "
35 " " "	104 "
40 " " "	148 "
50 " " "	231 "

And remember that every time you put Thermoid on a brake band you are protected by *Our Guarantee: Thermoid will make good—or WE WILL.*

Thermoid Rubber Company

Factory and Main Offices: Trenton, N. J.

Branches:
New York Chicago San Francisco
Detroit Los Angeles Philadelphia
Pittsburgh Boston London Paris Turin

Canadian Distributors:
The Canadian Fairbanks-Morse Co., Limited,
Montreal
Branches in all principal Canadian cities

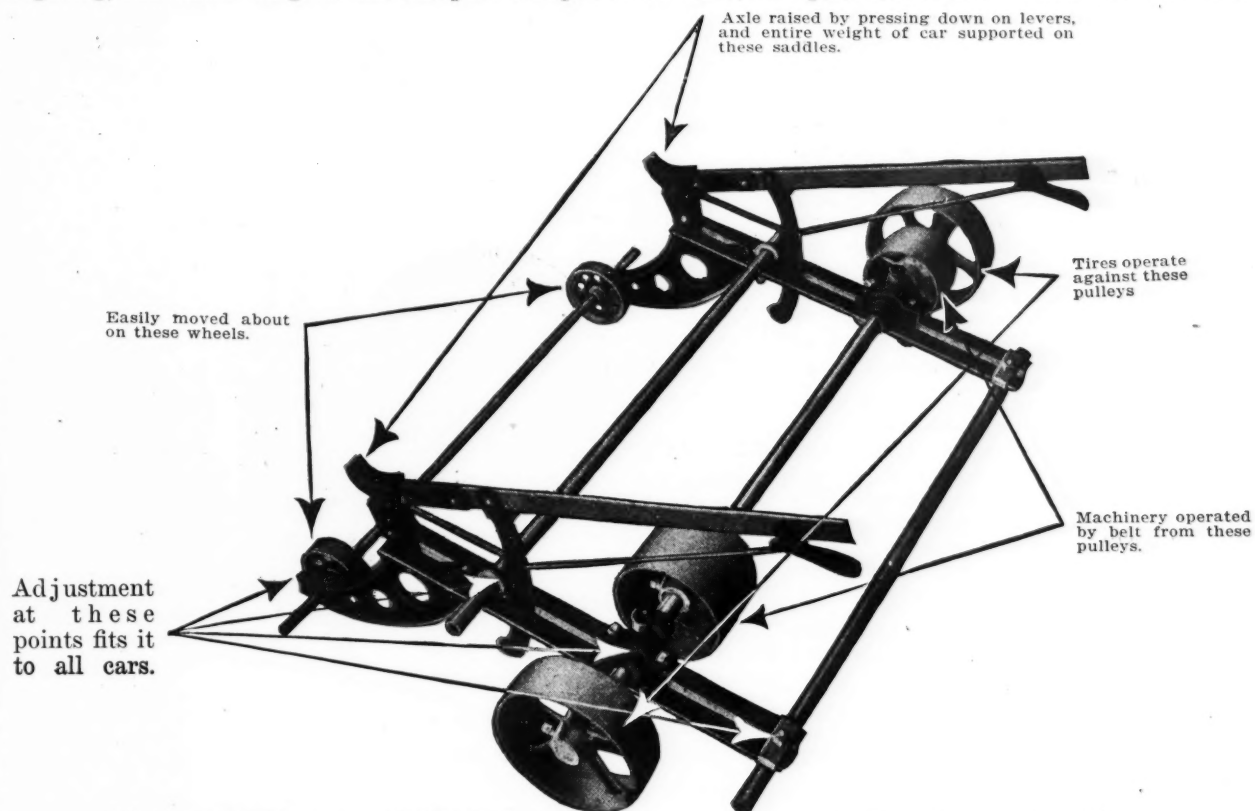


Makers of "Thermoid Crolide Compound Casings" and "Thermoid Garden Hose"

Help the farmer **SAVE** his crops!

The Mechanical Farm Hand!

LAY Porta Power will run Hay Press, Ensilage Cutter, Pea and Clover Huller, Rice and Grist Mill, Corn Sheller, Fanning Mill, Elevator, Buzz Saw, Milker, Cider Press, Separator, Washing Machine, Pump Jack, Irrigation Pump, Sprayer, Concrete Mixer, Grindstone, Shearing Machine, Drill Press, Force Pump for Fire Fighting, Thresher. It gives the cheapest belt power on earth, and puts the farmer's automobile to work.



**Made Entirely of Metal
Lasts a Life Time**

**It Doubles the Value
of the Farmer's Car**

LAY Porta Power

Manufactured by the **L. A. Young Industries, Inc.**, Detroit, Mich.
WRITE FOR DEALER'S PROPOSITION

—and even with the carburetor refusing to behave, we made every hill on high.”

“I knew that something was wrong when the motor began to miss. The carburetor was flooding and we couldn't adjust it. But after I turned the ignition switch to 'H' (High Frequency) the motor made no more fuss and we came along as smoothly as if everything were O.K.”

The Philbrin High Frequency System is a valuable help in emergencies like this when the carburetor cuts up, the mixture is poor, the spark plugs dirty or when the quality of the fuel is inferior. It is an integral though entirely independent unit of the Philbrin Duplex Ignition system. In place of a single spark it delivers a stream of sparks capable of firing any mixture and often under conditions that no single spark system could cope with.

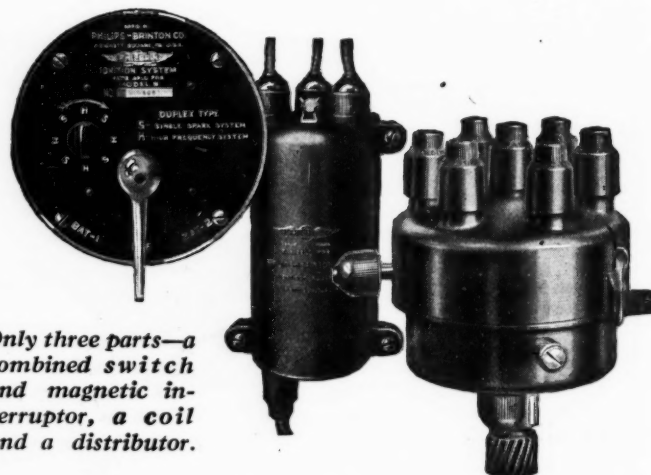
The car is operated nominally on Philbrin Single Spark Ignition—the primary unit of the Philbrin Duplex System. The Single Spark is possessed of many advantages. It successfully fires extremely lean mixtures due to the sharpness and intensity of its spark. It economizes on gas and adds to the motor's power. It reduces gear-shifting since it delivers an intensely hot spark at low speeds. It has ample capacity for any engine speed. Lag has been completely eliminated by the design of the Philbrin Contact Maker.

Philbrin Duplex Ignition is thoroughly practical and has fewer parts in fact than many single spark systems. The circuits for both systems are entirely separate. Simplicity and compactness are outstanding features. Philbrin Duplex Ignition is sold in models for all makes of cars with special mountings for magneto replacement. Special system for Ford cars utilizes current from Ford magneto.

Jobbers and Dealers interested in connecting with this advanced form of motor ignition should write us.

PHILIPS-BRINTON CO.

503 S. Broad Street, Kennett Square, Pa.



Only three parts—a combined switch and magnetic interruptor, a coil and a distributor.

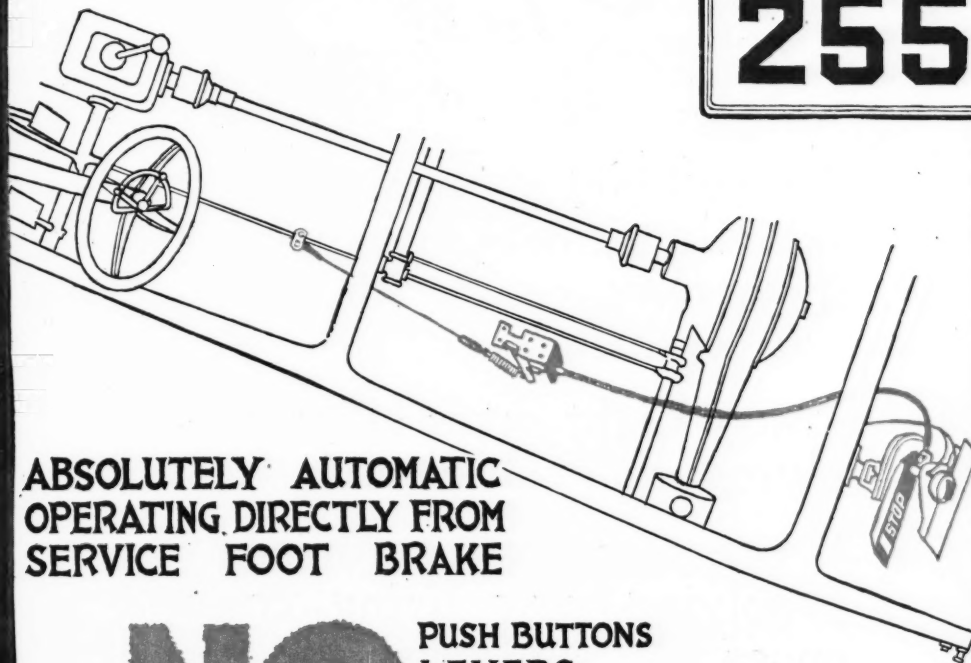
PHILBRIN

DUPLEX IGNITION

—with a second system to spur the motor to super-service.

When Writing to Advertisers, Please Mention Motor Age.

THE LAW SAYS
SIGNAL!
THE MAN BEHIND



ABSOLUTELY AUTOMATIC
OPERATING DIRECTLY FROM
SERVICE FOOT BRAKE

NO

PUSH BUTTONS
LEVERS
SWITCHES
VOLUNTARY ACT
COMPLICATED MECHANISM

COMER AUTO STOP SIGNAL

Price \$12.50

West of Denver \$15.00

As illustration clearly shows installation is very simple. Its operation is along the simplest lines—therefore its mechanical operations are insured—its constant readiness is certain.

The WONDER SALES Co.

616-617 HIPPODROME BLDG.

CLEVELAND, OHIO

Pacific Coast Agents

HUGHSON & MERTON, Inc.
LOS ANGELES SAN FRANCISCO PORTLAND

Ride with
a Feeling of
SAFETY
from Behind



*An Existing Market
for an Essential Product*

Lalley Light merchants serve the nation's farmers by supplying an imperative need with an essential product.

Lalley-Light saves labor by supplying reliable electric power.

It promotes farm efficiency by supplying new living conveniences and comforts.

Its market is ready and waiting and well-nigh limitless—a real buying market that needs only intelligent action from the seller.

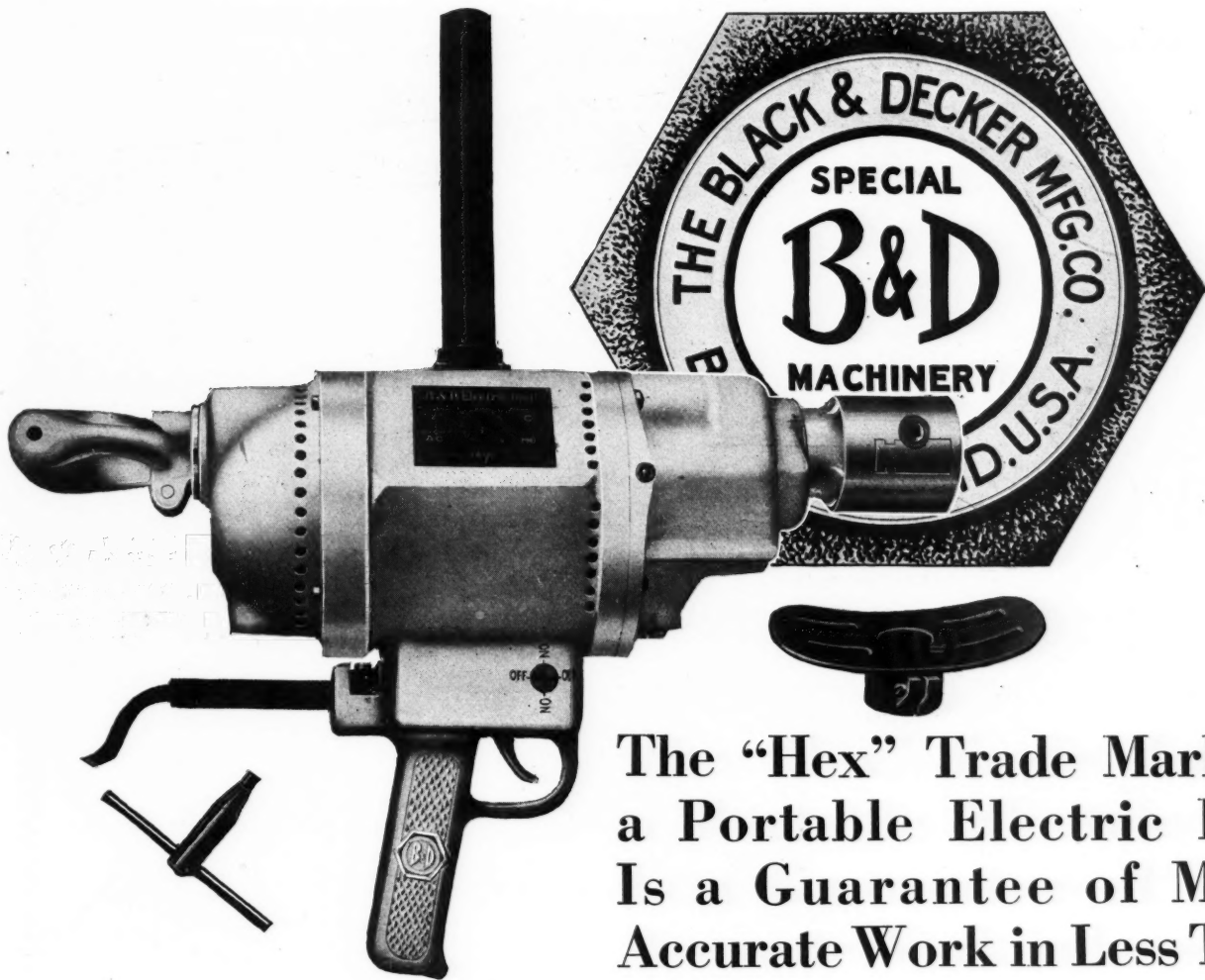
It is of paramount interest to all motor car dealers.

Wire or write for information.

Lalley Electro - Lighting Corporation
791 Bellevue Avenue Detroit, Michigan

LALLEY-LIGHT

ELECTRIC LIGHT AND POWER FOR EVERY FARM



The "Hex" Trade Mark on a Portable Electric Drill Is a Guarantee of More Accurate Work in Less Time

IN every plant where speed and accuracy are essentials of production, the B & D Hexagon trade mark on a portable drill is a reliable symbol of top notch efficiency.

Your workman has control of the electric current at all times, so that he can start and stop the drill **without removing either hand**. This unique feature, made possible by the Pistol Grip and Trigger Switch control prevents breaking of bits and saves much valuable time.

The B & D Portable Electric drill is the simplest and most accurate hand drill ever produced. The most unskilled workman

can operate it with ease, and do good work with little effort.

Wherever economy of time and tools is required, specify B & D Portable Electric Drills—the kind with the Pistol Grip and Trigger Switch. Prices range from \$50.00 up, according to size. Descriptive literature will be mailed on request.

The Black & Decker Mfg. Co.
111 Pratt Street Baltimore, Md.

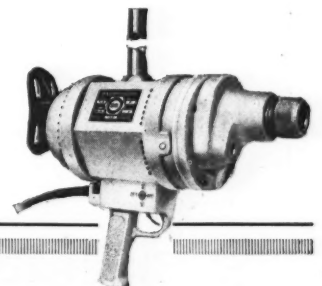
New York Office: Jordan Equipment Co., 68 Beaver St.

Canadian Distributors: **Northern Electric Company** Montreal Limited

English Distributors: R. A. Rothermal, 8 Poland Street, Great Marlboro, London, Eng.

B & D Portable Electric Drill

"With the Pistol Grip and Trigger Switch"





Costless Mileage

The material used in J and D Tires is capable of serving more—much more—than 5000 miles.

The painstaking scientific methods of treating and handling preserve the high quality of the materials.

Yet you pay for only 5000 miles of service. For the price is based on the guarantee—an extremely conservative one, as results have proved.

There is a surplus of mileage beyond what you pay for which makes J and D the most economical tire that you can buy anywhere at any price.

The motorist who maintains his car at little expense, and takes pride in his achievement, will appreciate the out-and-out saving which this will mean.



We have an interesting agency plan, with full protection and assured profits, for dealers in territories that are still open

J & D Tire Company
Charlotte, N. C.

New York Office, 1834 Broadway

QUALITY



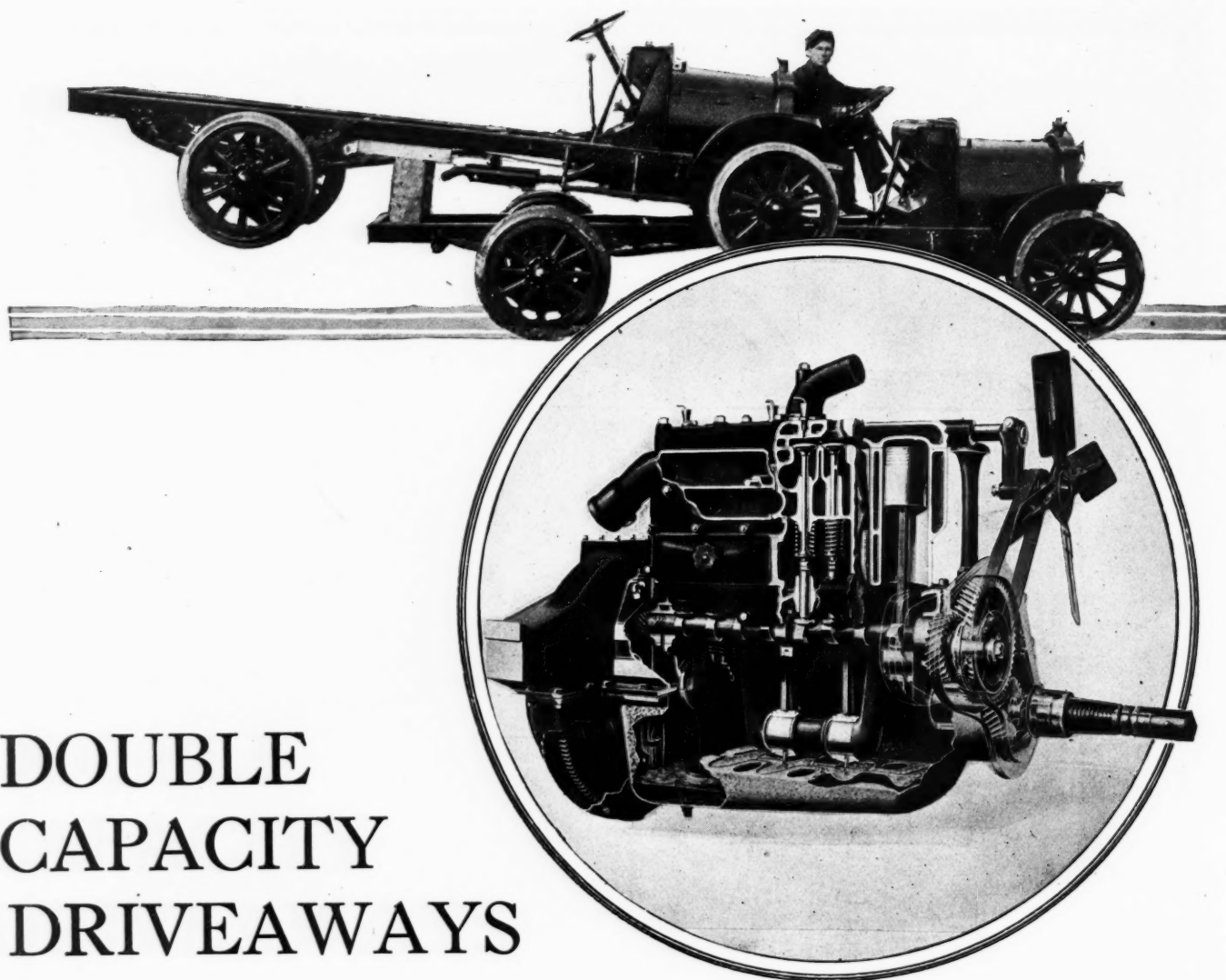
THE essential qualities of New Departure Ball Bearings that make for satisfactory performance are determined at the very beginning of things.

The resources of the New Departure organization combine to give these bearings a metallurgical structure which is of exceptional strength and durability.

The special chrome alloy steels are made to our own specifications, and under the personal supervision of New Departure experts. Thus it is that New Departure steels are unexcelled in this country or in any other, for the purpose to which they are put.

Bristol, Conn. - THE NEW DEPARTURE MANUFACTURING CO. - Detroit, Mich.
Conrad Patent Licensee.

**New Departure
Ball Bearings**



DOUBLE CAPACITY DRIVEAWAYS

The SPILLMAN "4" not only does this day after day for the Fulton Truck Company, but on one occasion, en route from Long Island City, stopped to pull three touring cars out of trouble and then beat those touring cars into Buffalo—all the time pulling a double-capacity load as shown in the picture.

This "4" is practically trouble-less. With virtually automatic lubrication and cooling systems, simplicity of design, emery-ground contact surfaces, extra heavily and sturdily built, it develops from 42 to 48 horsepower without strain or undue vibration.

*On 3/4-ton, 1-ton, 1 1/2-ton Trucks
the SPILLMAN "4" is unbeatable.
Comparative tests are invited
with any other engine in its class.*

HERSCHELL-SPILLMAN CO.
North Tonawanda New York

When Writing to Advertisers, Please Mention Motor Age



THE GENERAL TIRE

**They turn over fast for dealers
because they turn over far for users**

The policy of putting performance above profit is the basis upon which "General" tires are built—it is a principle rigidly adhered to in the production of the entire "General" line—it is the key-note of our success—it is directly responsible for "Generals" winning universal recognition for superiority, because we have confined our efforts to the business of building a tire that will build a tire business.

A dealer writes:—

"I am selling more GENERAL Tires, making more clear money, doing a larger cash basis business and best of all I don't have any grief making adjustments because your tires are right and standing up. I am under deep obligations to you for your winning me over to the best tire built in the United States."

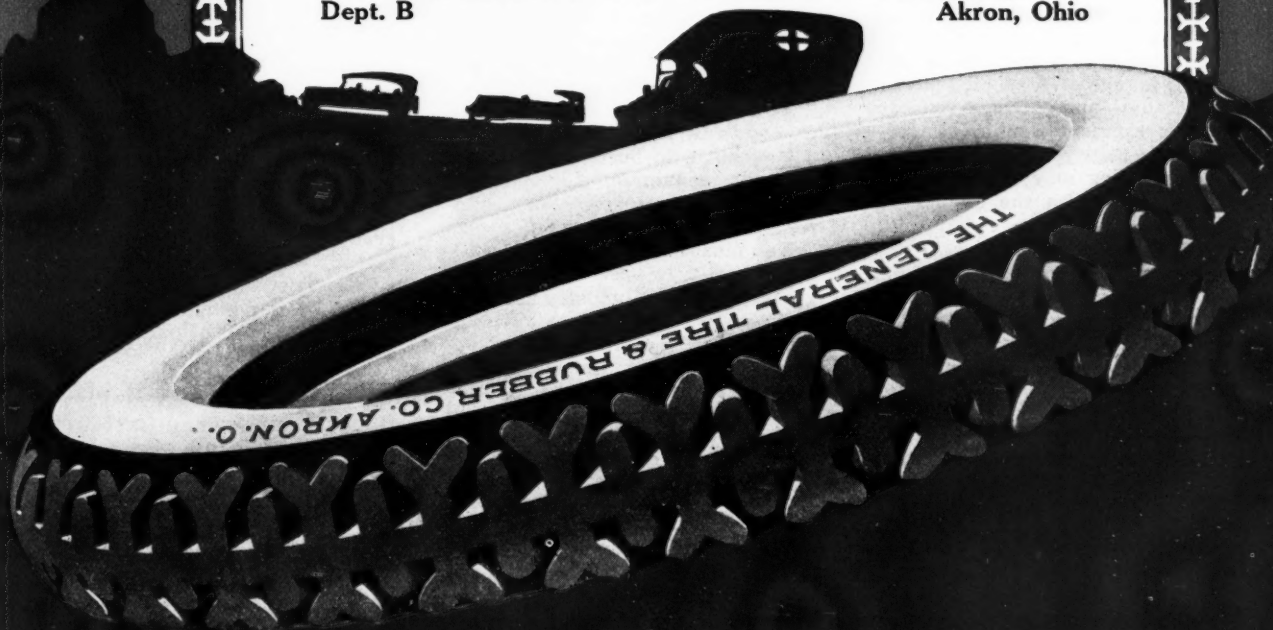
We have plenty of such evidence to prove the dealer's attitude toward the "General" line—but the real answer for the quick turn-over in profits to dealers is the great satisfaction enjoyed and the unusual economies "General" tires afford users.

If you are interested in building a big tire business the "General" line will interest you. Write us today.

The General Tire & Rubber Company

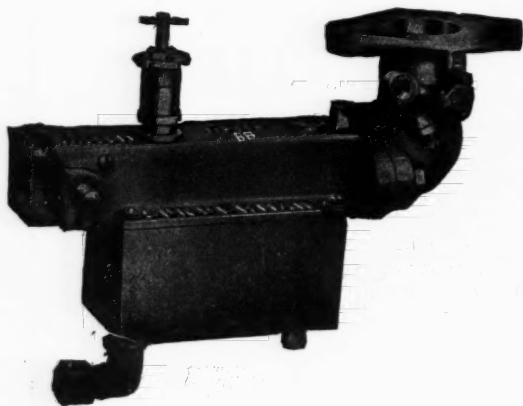
Dept. B

Akron, Ohio



SUNDERMAN

Vacuum Carburetor



MODEL BB

\$8 WITHOUT CONNECTION
 \$10 with regular connection
 \$12 with special connection

Model F—Special for Ford, **\$6**
 Metz and Saxon Four - -

F. O. B. Newburgh

Let This Carburetor Pay Your War Taxes

You Will Serve the Government at the Same Time

THE Sunderman Carburetor saves from 30 to 50% of gasoline on any car. If the Government taxes gasoline at 2 cents per gallon, that will equal about 8%. Our carburetor saves 30% at the minimum.

Figure it out: If you use 10 gallons on a trip now, with a Sunderman carburetor you will use no more than 7. Ten gallons at 25 cents plus 2 cents war tax cost \$2.70. Seven gallons at the same price and tax cost \$1.89—a clear saving on one trip of 81 cents—as a minimum—and you have rendered the Government double service—you have paid your tax and saved gasoline. You may buy War Savings Stamps with the money you save.

If the Government taxes you on the basis of the price of your car, the savings in gasoline cost made by a Sunderman Carburetor will pay the tax for you and leave a substantial remainder. And still you'll be serving the country—you can "carry on," do your duty and preserve your personal efficiency through recreation and the proper

use of your car for business or semi-business purposes.

Your Paramount Duty To-Day

Whether you are a manufacturer, a jobber, a dealer, a garage or repair man, or an owner of a motor car or truck, your duty to your Government and the industry that supports you is plain:

You must co-operate with every measure decided upon to help along the efficient conduct of the war.

You must conserve the use of fuel and raw materials.

You must do business up to the patriotic maximum—for in that way only can you serve your country best.

You must devise ways and means to save and to serve so that the great automotive industry shall not only live—it must thrive. Whether the men at Washington fully appreciate it or not, the automotive industry's development in America is the chief—we had almost said the only—factor that will make possible the certain victory to

which America's millions have pledged themselves.

Your Course Is Plain

No matter what branch of the business claims your interest, you must begin to serve through saving.

Any plan or instrument that saves you or your customers money enables you to take care of new tax demands and still leaves you free to serve further.

We offer the Sunderman Carburetor on this basis. Our business has increased remarkably this year for just this reason.

It saves from 30 to 50% of gasoline—thousands of car owners are proving that statement. Many do even better. At the same time it gives more power, greater flexibility, faster pick-up, quicker getaway, better hill-climbing, more economical idling and helps to prevent carbon.

Your opportunity is plain—Order a Sunderman Carburetor at once.

Dealers—Can't you see the handwriting on the wall? Write for our proposition at once.

Sunderman Corporation,

11 Chambers St., Newburgh, N. Y.

PACIFIC COAST BRANCH: 593 MARKET ST., SAN FRANCISCO, CAL.



WOOD

WHEELS for MOTOR VEHICLES

BROAD and CHESTNUT STS.
PHILADELPHIA

On the finest cars in America

The wood wheel is standard equipment on practically every passenger automobile in the country.

For this reason:

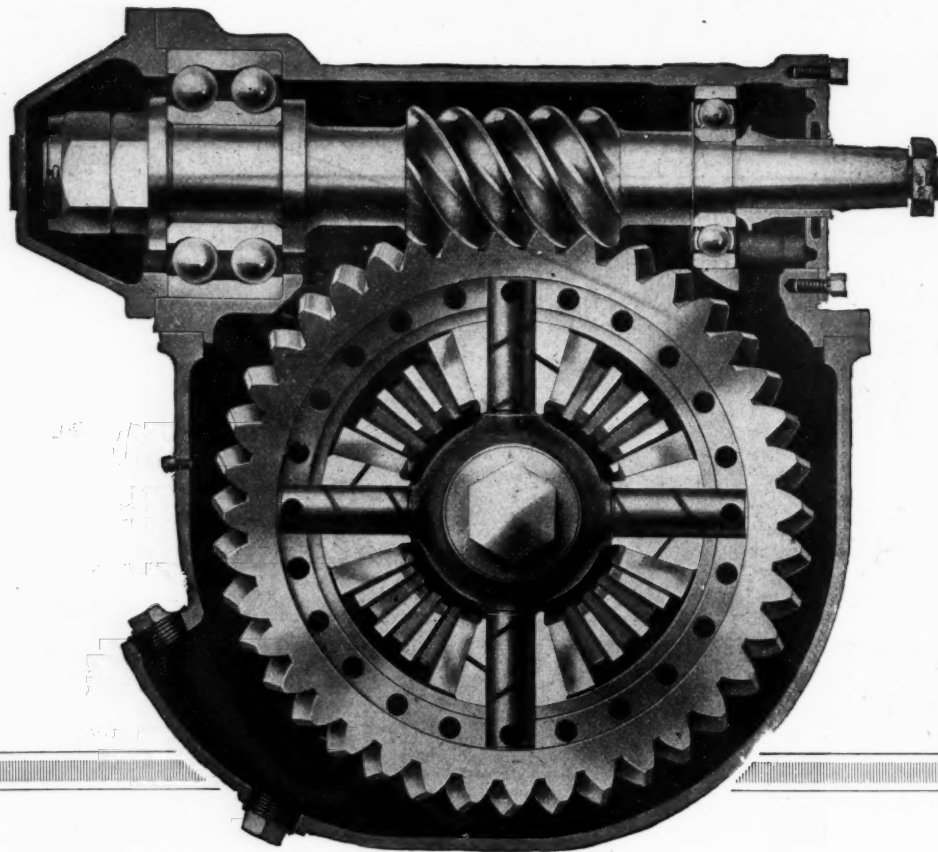
Manufacturers and owners of motor cars know that wood wheels are strong, tough, resilient and that they will outlast any car that has ever been built.

They know that wood wheels not only give perfect service and satisfaction, but that through their shock-absorbing qualities they lengthen the life of every other part of the car they carry.

**AUTOMOTIVE WOOD WHEEL
MANUFACTURERS ASSOCIATION**
105 NORTH 13th STREET PHILADELPHIA

**NOTE
THE
WOOD
WHEELS
EVERYWHERE**

When Writing to Advertisers, Please Mention Motor Age.



Ball Bearings on The Worm Gear Mounting

EVERY part—even the most minute—of the Sheldon rear axle assembly has a definite mission. It has its role to play in reducing wear, in warding off breakdown, in absorbing stress. Consequently there are no expedients in the Sheldon design. Each part must bear as intimate a relation to the completed structure as do the parts of the human body to the whole.

Hence the use of ball bearings on the worm gear mounting. Here, where tremendous grinding thrust loads are encountered *continuously*,

ball bearings alone have the capacity to resist and absorb the resultant strain and friction with the minimum of wear.

Furthermore, none but ball bearings can compensate for the elongation of the worm (due to frictional heat). In Sheldon axles this is provided by allowing the radial ball bearings free to float, at the front end of the worm.

In this, as in all other characteristics of design, Sheldon Rear Axles give ample assurance of their ability to meet every demand of road, load and continuous service.

SHELDON
WORM DRIVE
REAR AXLES

SHELDON AXLE & SPRING CO.



Makers of Springs and Axles for Heavy
Duty Service for more than Fifty Years



WILKES-BARRE, PENNSYLVANIA

USL

U S LIGHT & HEAT CORPORATION

PLATES— the Life of a Battery

NO matter what happens, your battery can be repaired at slight expense, unless the plates fail. When plates go, the battery dies.

Be sure, then, that your new battery is a USL with the USL exclusive machine-pasted plates. It is sold on a 15 months' guaranteed adjustment plan. It is the rugged, powerful, long-life battery.

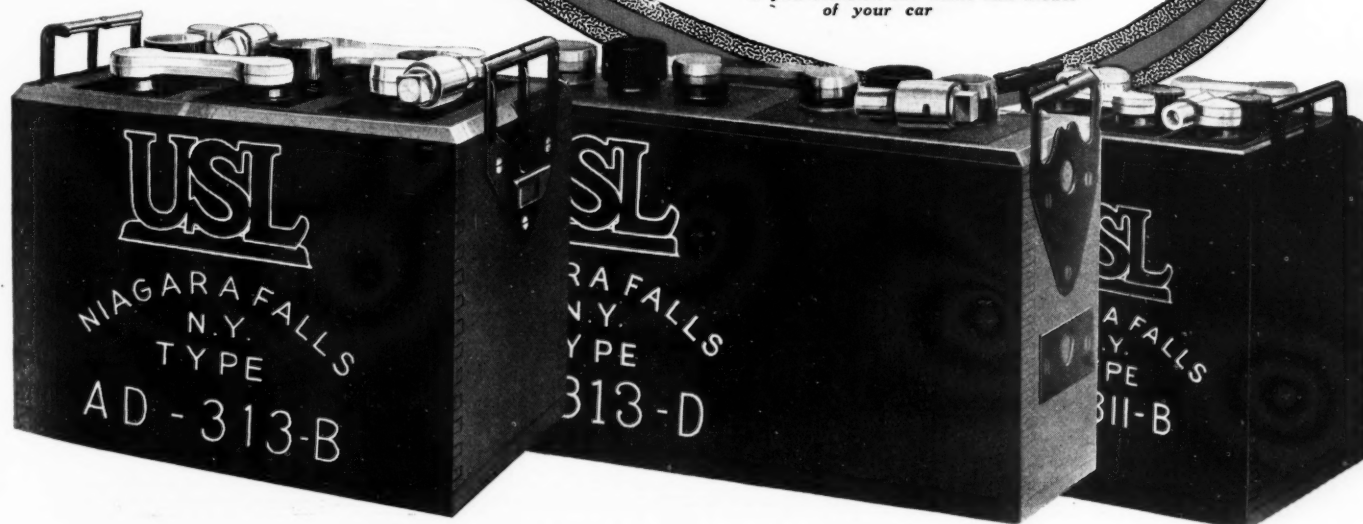
Visit the USL Service Station in your city regularly for free battery inspection. It will add months of life to your battery.

U S LIGHT & HEAT CORPORATION

Factory: NIAGARA FALLS, N. Y.

Branches: { New York Chicago San Francisco
 Detroit Kansas City Washington, D. C.

*We will send you a 50c Battery Book Free
if you mention the make and model
of your car*



When Writing to Advertisers, Please Mention Motor Age.



JOHNSON CARBURETOR

Will Give the Highest Economy with Good Performance or Best Performance with Good Economy. No Carburetor Can Do More.

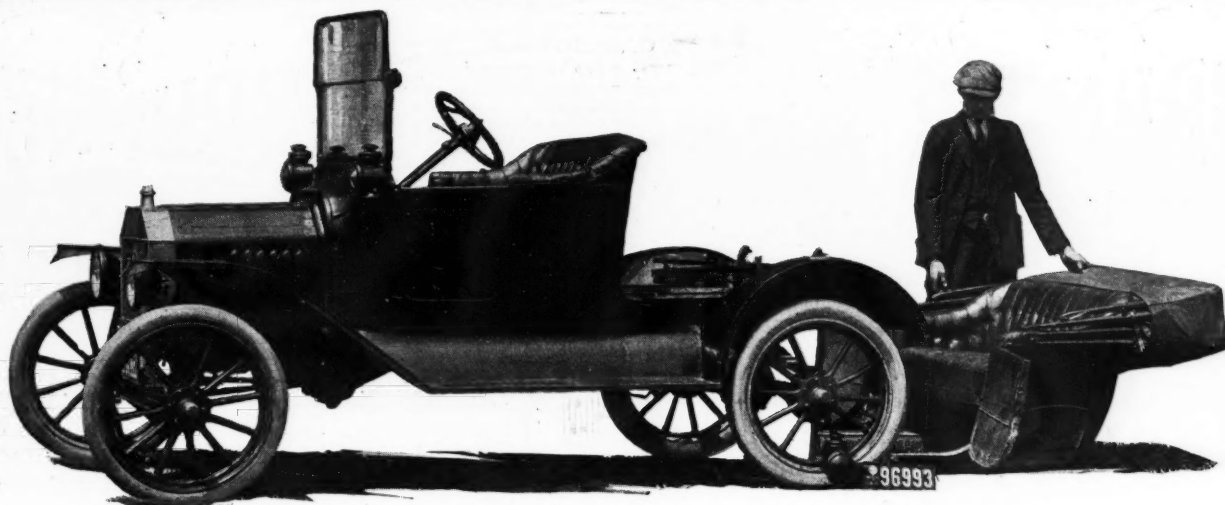
JOHNSON COMPANY

*Makers of Superfine Instruments
of Carburetion*

DETROIT MICHIGAN

BUSINESS SOLICITED FROM MANUFACTURERS ONLY





One Demonstration Sells the Heath DUPLEX

From all parts of the country dealers are reporting that one demonstration is sufficient to sell the Heath DUPLEX.

In the cities, plumbers, carpenters, electrical contractors, storekeepers, etc., have welcomed the Heath DUPLEX as the solution of how to secure both passenger and commercial service from one Ford touring car.

The welcome accorded the Heath DUPLEX by the farmers has been even more enthusiastic.

Here in Detroit one of the large body companies, operating several plants, has purchased a Heath DUPLEX for a Ford car that is used in conveying small freight and workmen between the factories.

Recently the publisher of an agricultural paper asked us to ship a Heath DUPLEX immediately to a large farm he operates.

All of which emphasizes that the Heath DUPLEX is already a big success, and growing bigger.

It is easy for dealers to show prospects that it will pay for itself in a month's time.

They simply demonstrate that it makes a Ford touring car do the work of two cars.

What the Heath DUPLEX Is

The Heath DUPLEX consists of a folding delivery body 4 feet 4½ inches long, 32 inches wide and 10 inches deep, and two specially shaped angle iron supports.

In the original installation the tonneau of the Ford touring car is made removable while the front seat remains in place.

The angle iron members attach firmly to the Ford chassis and the folding delivery body attaches to these.

When the car is used for passenger carrying the Heath DUPLEX folds out of sight under the tonneau.

To use the car for work purposes, the tonneau is slid off and the delivery body unfolded. Either change can be made in 60 seconds.

In the illustration the tonneau has been slid off so that the Heath DUPLEX can be opened up.

This operation takes but 60 seconds. It can be changed back to a passenger car in the same time.

Some desirable territory is still open.

McCord Manufacturing Company, Inc.
Division D
Detroit, Michigan

Heath
Duplex **\$57.50**
F. O. B. Detroit
PATENTED MAY 12 1908, DEC 19 1916



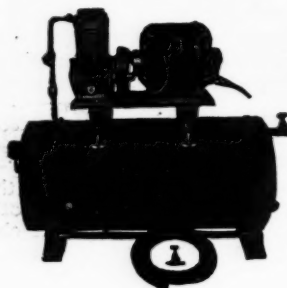
WE USE A BRUNNER AIR COMPRESSOR
FREE AIR
 FOR YOUR CONVENIENCE

The confidence of the motoring public is the garageman's greatest asset. The average motorist knows that Brunner Service is absolutely dependable and has confidence in the Brunner Equipped Garage.

Without the confidence of the motorist no garage can be successful because the present day motorist expects and demands high class service and knows where to get it—he knows that the garageman who places Brunner Air Service at his disposal is a live wire with the interest of the motoring public at heart, and when he sees the Brunner Sign on a garage he has confidence in that garage and stops for air and such supplies or service as he may be in need of, and he never has to drive on his way disappointed.

IF YOU INSTALL A **BRUNNER** AIR COMPRESSOR

You will find it just as dependable and satisfactory as thousands of other garagemen have found it for years. You will find it a wonderful time saver, and you will find it to be exactly as represented in every way.



You will also find the trade of the Brunnerwise motorist both satisfactory and profitable for the reason that he appreciates good service and is a good spender—he is a firm believer in reciprocity—he follows the Brunner Sign.

When you buy a Brunner Air Compressor you buy a quality product which has always been sold on its merit without resort to advertising promises of impossible performances, you receive it with the guarantee of both the manufacturer and the Brunner Jobber who takes your order that it will do the work for which it is recommended and be found exactly as represented—you cannot possibly go wrong with a Brunner Air Compressor.



"The Motorist who is Brunnerwise knows Brunner Service Satisfies"



Write for No. 15 Catalogue and the name of the Brunner Jobber covering your territory. Get acquainted with the Brunner line.

BRUNNER MANUFACTURING COMPANY

General Office and Plant
 UTICA, N. Y.

Cincinnati Branch
 CINCINNATI, OHIO

Genco Light

Will Make Money for You

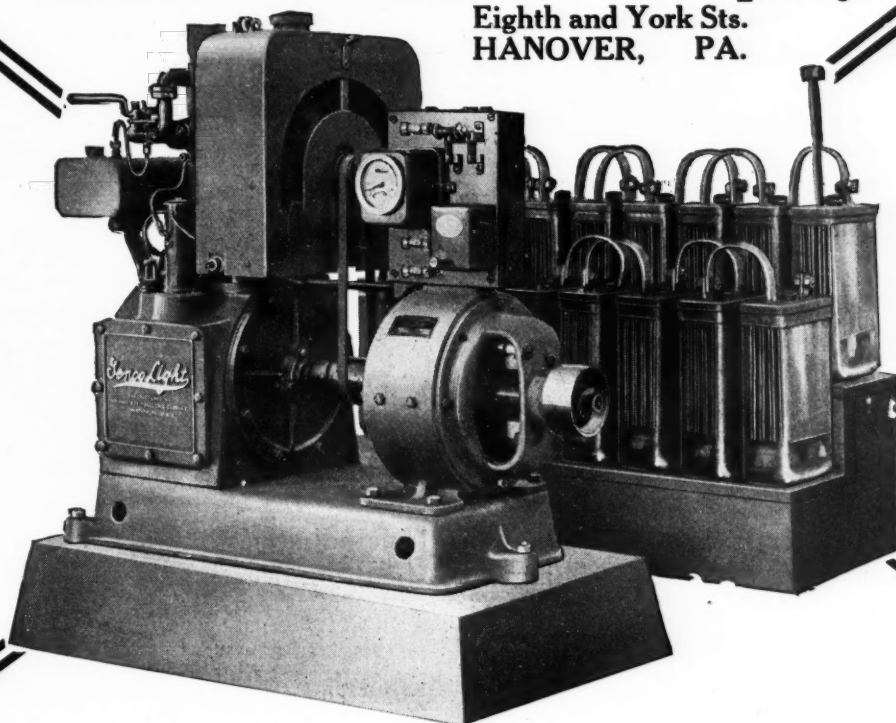
DEALERS who have felt things getting dull in other lines will find that the Genco Light will fill out the holes that have appeared in the profit columns.

We are now in a position to take care of new dealers in certain territories and are making live men a proposition which is attractive enough to interest all dealers who have been making big successes in selling where most of the business is done with farmers.

Write us for full particulars regarding your territory today.

General Gas-Electric Company

Eighth and York Sts.
HANOVER, PA.



Consider These Specifications

Engine: High grade, vertical, 4-cycle, valve-in-head, counterbalanced crank, internal fly wheel.

Carburetor: Burns kerosene, gasoline or alcohol. Adjustable handle for easy starting and for different fuels. Fuel tank holds one gallon and is connected to carburetor with copper pipe.

Ignition: Special 32 volt type, distributor and coil.

Lubrication: Improved splash system of patented design. Oil gauge on crank case indicates oil level.

Cooling System: Cellular radiator, bolted to cylinder of engine; special adjustment to suit weather conditions.

Generator: Our own design specially constructed in our own factory. Gives high efficiency under rated load. Armature shaft supported by annular ball bearings.

Control Board: Bolted integral with generator; equipped with amperage hour meter—Bi-pole switch connects battery to plant. 2, 30 ampere fuses on house circuit, 5 amp.

fuse on ignition circuit. All wiring at the rear completely enclosed and protected.

Starting Switch: Outfit is started by pressing button on control board. Special cutout stops engine automatically when battery is fully charged.

Battery: Our own special make, 16 sealed top glass jars—plates extra thick, insuring long life. Cells shipped fully charged.

Mechanical Power: Engine provided with pulley for driving machinery or line shaft direct. Engine delivers 2 H.P. for such work.

Never Be in Doubt Over Electrical Problems

You need not be, and you can do five times more effective and profitable work every day in the week by using the



Automotive Wiring Manual

—formerly—

Official Auto Wiring Guide

Think what it will mean to you to know the electrical system of any car, and the internal wiring of the generators, starters, cutouts, switches, coils, etc., of any of the many starting, lighting and ignition systems like an open book.

Quit Guessing—Know!

Your reputation as an electrical expert will not be made through an occasional lucky guess. You should know and know every time just what you are doing.

The AUTOMOTIVE WIRING MANUAL will help you to quickly solve each and every electrical problem on any car. It shows in blueprint form a guaranteed accurate diagram of the exact wiring of all cars from 1912 to and including 1918 models; also motor trucks and motorcycles. Over 700 distinct diagrams in all; more than 100 being internal diagrams of generators, starters, controllers, switches, etc. Practical instructions on the repairing of batteries, coils, motors, etc., are included.

Special Price

\$10.00

Delivered



Regardless of what you may or may not know the AUTOMOTIVE WIRING MANUAL (formerly Official Auto Wiring Guide) will prove the best investment you can make, and will pay the highest interest. Each day you are without one you more than lose its cost to you.

*Make the right start now
by ordering your copy from*

U. P. C. BOOK COMPANY, Inc.,

Book Departments of Motor Age, Motor World and Automotive Industries

243-249 West Thirty-Ninth Street New York City

When Writing to Advertisers, Please Mention Motor Age.

Here's a Real Tractor!



Now Farmers Can Speed Up Their Work as Never Before

It's been long in the making, this startling contribution to farm work efficiency. It had to be, to achieve its great purpose. It's been long wanted, too—and now it is here, after years of planning, designing and testing.

The HESSION Farm and Road Tractor is all things in one, for the farm—it tills the soil, hauls to market, and does all the work of a stationary engine. It has quick, interchangeable solid-rubber-tired wheels for road work.

Speed, with heavily loaded trailer, 10 miles an hour. Never has the world seen so light weight a tractor with such power—such economy of operation—such sturdiness and simplicity of construction.

None but the very finest mechanical units are in its assembly. It takes all the work you can give it—and has ample capacity for more. Its wonderfully simple design means **permanent freedom from trouble.**

Give it one-tenth the care your horses receive and it will maintain its original efficiency year in and year out.

That's the new HESSION—the world's greatest all purpose tractor!

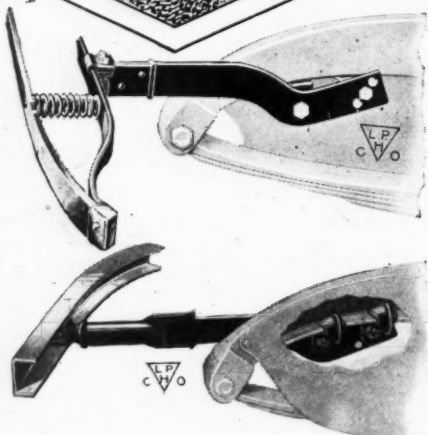
HESSION TILLER & TRACTOR CORP'N
27 Jewett Avenue Buffalo, N. Y.

The dealer who sells HESSION Tractors makes competition for the other fellow—and has none himself. You'll have to hustle if you want the HESSION dealership for your territory. You won't want to compete against it. Write now for details.



A Real Interchangeable Bumper

HALLADAY BUMPERS



That fits practically all cars with extension frames.

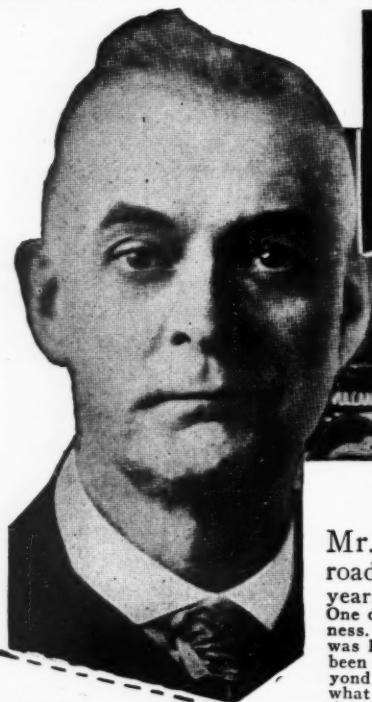
Attached without cutting, drilling or in any way altering the frame or aprons.

The steel side arms have enormous strength against direct thrust and spring laterally relieving the frame from side blows.

Sold by all live dealers.

If your dealer does not carry them, write us, we will refer your inquiry to one who does.

L. P. HALLADAY COMPANY, Streator, Illinois



I EARNED \$2200.00 IN FOUR MONTHS

This Is Richard A. Oldham

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. During all those twenty years, he drew the customary monthly salary of a telegraph operator—no more—no less. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Repair Business. In a few weeks he had purchased and installed a Haywood outfit, and was doing business for himself. He was **His Own Boss**. A short time ago he wrote us that his income in four months was as much as it had been in Two and One-Half Years as Telegraph Operator. You men who have been left at home—who are beyond the draft age, can and must take up the burdens left behind by others. Oldham is a living example of what can be done. I have 500 places to be filled now. 500 stations where tire repairing is neglected, because there is no one to do it.

M. HAYWOOD, Pres.
**HAYWOOD TIRE &
EQUIPMENT CO.**
501 Capitol Avenue, Indianapolis, Ind.

Dear Sir: Please send me your book on Haywood Tire Repair Plants and full particulars on your National Tire Repair Service and details of your FREE school of tire repairing.

Name

Address

I Must Have 500 Men to fill these places within the next sixty days

I have a big interesting book to send you—a book about tires—it explains this business—gives inside figures and profit. Gives actual proof of success—letters of others who are now operating Haywood Shops and making big money. What these men have done you can do. \$2,500 to \$4,000 a year is conservative. One machine will give you a start. You can see business all around you—everywhere there are automobiles there are tires that need repairing. You know that. All you do is open a shop—put out a Haywood sign, and auto owners will come to you and the service you bring them.

Sign the coupon and mail it today, or send a post card or letter.

HAYWOOD TIRE & EQUIPMENT CO.

M. HAYWOOD, President

501 Capitol Avenue, INDIANAPOLIS





The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

Install a Curtis Air Compressor

Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

CURTIS AIR FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

Curtis Pneumatic Machinery Co.

1527 Kienlen Ave., St. Louis, Mo.

Branch Office—530-H Hudson Terminal, New York City



The Most Remarkable Top Material Yet Produced



Many of the best cars have a DRIDEK Top. Many of the wide-awake manufacturers are using DRIDEK exclusively for Tops and Upholstery. It is light and strong; will not scratch or blister.

If you don't know all about DRIDEK—
send for samples and price list at once!

L. J. MUTTY CO., Dept. C, Boston, Mass., U. S. A.



FAFNIR

BALL BEARINGS

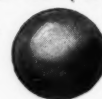
THE FAFNIR BEARING COMPANY

Conrad Patent Machine Co.
Main Office and Factory: New Britain, Conn.
Detroit Office: 752 David Whitney Bldg. Chicago Office: 1919 So. Michigan Ave.

HOOVER

STEEL

BALLS



Gain World Supremacy

FOR many years the United States was dependent upon Germany for its supply of high-grade steel balls.

That day has passed, never to return.

The Hoover Steel Ball, developed, perfected and produced in ample quantities to supply the requirements of America and Allies, is the superior of any steel ball ever previously manufactured in Germany, or anywhere else.

A complimentary copy of "The Evolution of the Steel Ball Industry" awaits your name and address.

HOOVER STEEL BALL CO.

Ann Arbor, Michigan, U. S. A.

*The Hollenden
Cleveland*

"Home of The Cleveland Auto Club"

THE Hollenden is complete in every facility make you comfortable in body and mind. Eight hundred delightful rooms; numerous club-like parlors; four splendid restaurants. Near theatre, shopping and financial districts, and all terminals of travel.

EUROPEAN PLAN WITH BATH

For One Person, \$2 to \$5

For Two Persons, \$3 to \$6

With Twin Beds, \$4 to \$6

Suites at Various Prices

Ample garage facilities immediately adjacent
Official A. A. A. Hotel

Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

and get out of your tires all the miles they can give.

Price in U. S. A. **\$1.25**

At your dealer or

A. SCHRADER'S SON, Inc.

783-803 Atlantic Avenue, Brooklyn, N. Y.



SCHRADER



JEWELL BATTERY GAUGE

**The Ever Watchful Guardian
Of Your Battery.**

Warns you of any battery trouble in ample time to prevent its becoming serious.

Tells you all that you can learn by hydrometer tests and carries that information constantly before you, as easily read as the record of your speedometer.

The greatest convenience ever put on an automobile and a fully paid insurance against battery troubles.

If your dealer cannot show you, write us. You cannot afford to be without it.

Manufactured by
JEWELL ELECTRICAL INSTRUMENT CO.
1646 W. Walnut St., Chicago

Exclusive Sales Representatives
GRAY-HEATH COMPANY
1440 Michigan Ave., Chicago



*The old way that means greasy hands
and soiled clothing*

DEALERS!

HERE IS A REAL PROPOSITION

Every car owner is a prospect for Shield's Injector, the Perfect Grease Gun. Every motorist is interested at once and is soon convinced.

Sales are quick, easy and numerous. This grease gun has been perfected to a point where no disadvantage can be found against it. Its advantages can be explained by any dealer in a few minutes. Not many sales will be missed. It is a real proposition for every dealer who wants a sure selling, quick selling, easy selling article to build up his profits.

SHIELD'S INJECTOR A PERFECT GREASE GUN

PRICE COMPLETE, \$7³⁰
including twelve
cartridges of grease

Strong and durable in construction—nothing to break or get out of order. Absolutely the most efficient and satisfactory grease gun that has ever been placed on the market.

Made of steel, finished in black baked enamel with nickel plated ends and handle. Will last a lifetime.

Greasy hands, ruined clothing, and wasted time are things of the past for the motorist who owns a Shield's Injector.

Every dealer should get our proposition

WHEELS-WILSON AUTO SUPPLY CO.
SHREVEPORT LOUISIANA



*Just slip in a cartridge of grease
and the gun is ready for work*



*The new Shields way that means
convenience, comfort and saving
of time*

Every time you use this jack you give a demonstration



Why the Kimball Ball-Bearing Auto Jack is a sure-fire self-seller

WHEN a customer sees you put a Kimball Ball-Bearing Auto Jack under his car you have practically landed his order. The reasons are these:

1. You don't have to crawl under the car to put the jack in place or to hold it there.
2. You give only a few easy turns to the long handle to raise the car.
3. You merely reverse the turns to lower the car, and you pull out the jack by the handle.

The customer sees that every operation of raising and lowering the machine is accomplished in an easy, convenient manner.

He sees that with the Kimball Jack he can avoid dirt and grease; eliminate all chance of ruining his clothing and injuring his hands. That is the kind of a jack he wants.

Exclusive Kimball features
Diamond point hardened steel top with *bull-dog* grip. Ball-bearings carry the lift and thrust. No pawls; no ratchets. Ball socket holds handle rigid while sliding jack under car. Folds up; comes in small bag; takes up little space in tool box.

Look into this chance for extra profits

Your customers are coming to realize the need for a *reliable*, easy-to-use jack. Take on the Kimball Auto Jack and you are bound to land some profitable business—especially if you let the Kimball demonstrate itself. Write at once for full particulars.

Size	Prices		Price
	Minimum Height	Extended Height	
No. 1	9 in.	15 in.	\$7.00
No. 3	11 in.	18 in.	7.00
No. 4	12 in.	20 in.	7.00

Kimball Special Truck Jack that easily raises any style truck sells for \$15.00.

SALES DEPARTMENT

Edward A. Cassidy Co., Inc.

Madison Avenue at 40th Street, New York

Manufacturers, F. W. Mann Co., Milford, Mass.

KIMBALL AUTO JACK

BALL BEARING

MORE LITE AUTO LENS

Don't get the idea that the More-Lite Lens is merely a device to enable car owners to escape arrest.



It is legal in all states, but first of all it is a lens that gives a better, safer light to drive by.

Dealers tell us it is the easiest selling lens on the market, and 600,000 pairs sold in less than a year is pretty good proof.

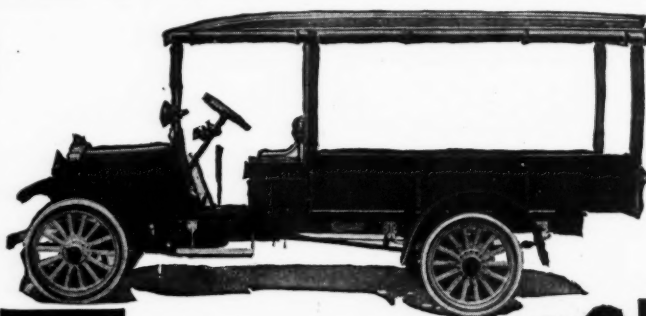
Interesting terms to dealers and jobbers

LIST PRICES

Inches	Per pair	Inches	Per pair
6 to 8 1/2 dia.	\$1.50	9 1/2 to 10 1/4 dia.	\$2.00
8 1/2 to 9 1/2 dia.	1.75	10 1/2 to 11 1/4 dia.	2.25

We operate our own large factory

L. E. SMITH GLASS CO., Mt. Pleasant, Pa.



Commer

A Year Ahead of Other Trucks

The only truck having everything necessary on it—when you buy it

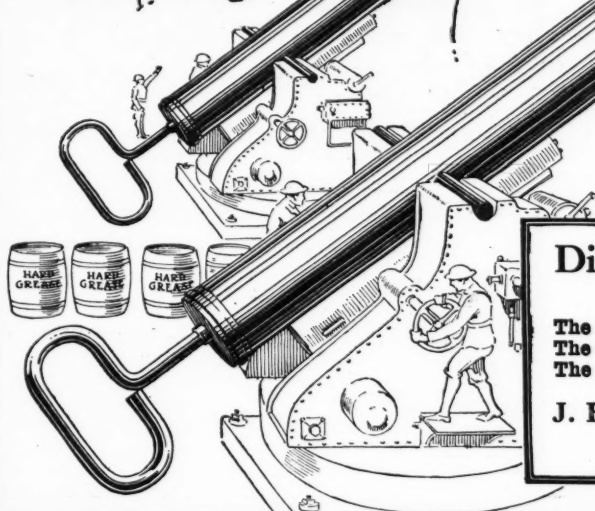
Three types of bodies for all models—Bijur Starting and Lighting System, with Dixie Magneto Ignition—Stewart Vacuum System—Pierce Governor—Windshield—Bumper. Continental Motor (3 1/4 x 5)—Torbensen Rear Axle—Detroit Steel Products Company Springs.

One-ton Chassis	\$1340
With Express Body	1375
With Post Top and Storm Curtains	1450
With Standard Stake Body	1490

THE COMMERCE MOTOR CAR COMPANY
DETROIT, MICH.

W. H. Brinkerhoff, Eastern Dist. Mgr.
Belmont Ave., Elmhurst, Long Island, N. Y.

The ROSE GREASE GUNS Make a HIT Every Time



First in War
Used by the U.S. Army and Navy
First in Peace
Backed by an Army of Satisfied Users

Distributed by Most Jobbers & Dealers

MADE IN THREE SIZES

The Rose Auto Gun for the individual car owner.....Price \$1.80
The Rose Universal Gun for the car, truck and tractor.Price \$2.50
The Rose Shop Gun for the garage and repair shop....Price \$3.50

J. H. HANEY & COMPANY HASTINGS, NEB.
MANUFACTURERS:
ROSE TIRE PUMPS and ROSE GREASE GUNS

▼ SERVICE STATION ▼ ON ELECTRICAL REPAIR WORK



Get acquainted with this sign
WHEREVER YOU SEE IT YOU MAY
BE ASSURED OF HAVING EXPERT
SERVICE ON MAGNETO, IGNITION,
STARTING AND LIGHTING REPAIR
WORK. ALSO ARMATURE RE-
WINDING OF EVERY DESCRIPTION
PAUL G. NIEHOFF & CO. INC.
TELEPHONE SUPERIOR 7091
232-242 E. OHIO ST. CHICAGO

"THE WATCHDOG OF THE GASOLINE SYSTEM"

—and the ONLY gauge approved by the
Stewart-Warner Speedometer Corporation
for use with Stewart Vacuum Tanks.



You have a gauge for
showing oil pressure,
one showing battery
conditions, one for
water temperature,
etc., but you over-
look keeping tab on
a very essential part
of your car; namely,
the gasoline feed.

The J-A-Y Vacuum Gauge will practically eliminate any stop
on the road which could be charged to the vacuum tank. The
J-A-Y Vacuum Gauge shows you each float operation of your
vacuum tank; the amount of vacuum in the vacuum tank at the
various operations of the throttle, and enables you to tell how
far you are going on one float operation or on 1-40 of a gallon of
gasoline. One float operation with your engine throttled down,
will require about three seconds. If it takes much longer, this
indicates that there is a stoppage in the line from the rear tank
to the vacuum tank. If your vacuum
has been showing high on the scale of
the gauge, and you find that it has
dropped, showing a low vacuum, this is
an indication that there is a leak of
air into the vacuum tank. These con-
ditions should be attended to on reach-
ing destination.

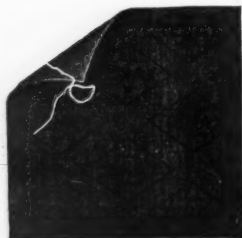


The price of the J-A-Y Vacuum Gauge,
with fittings and instructions for in-
stalling, is \$5.00.

Webb Jay Corporation
900 So. Michigan Ave.
CHICAGO ILLINOIS

TENAX Compressed ASBESTOS

Sheet Packing Gaskets



Sheet Packing

A standard line of Asbestos Products—made right and priced right for the automotive jobber and dealer trade. Good discounts.

Tenax Compressed Asbestos Sheet Packing furnished in sheets 50" x 50". Special size 50" x 150".

Thicknesses of 1/32" to 1/8" inclusive.

Perfect gasket sheet stands temperature of 1200 degrees Fahr.

Tenax Gaskets make tight joints. Won't blow, burn or squeeze out. Extremely light weight.

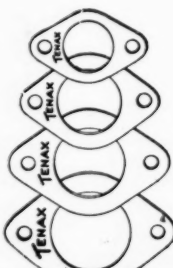
Brakebestos—a perfect asbestos wire inserted lining for truck and tractor friction brakes, clutches, etc. Heat, oil and water proof.

Vulcan Fan Belts are non-slipping, long life type and can be furnished in either endless or detachable style.

Send for liberal sales proposition.



Vulcan Fan Belts



Gaskets

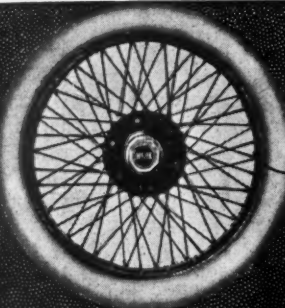


Brakebestos

ADVANCE PACKING & SUPPLY COMPANY

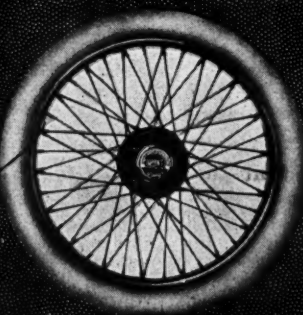
Tractor Dept. 13-15 N. FRANKLIN ST., CHICAGO, U. S. A.

WIRE WHEELS



HOUSE
QUICK CHANGE

for 150 makes of cars.
Write for full information
and prices on wire wheels
for any make or model of
car.



HOUSE
for Fords

List price for set of 5 wire wheels, 4 inner hubs, 4 hub caps, 1 hub cap wrench, 1 spoke nipple wrench, 1 hub dust cover for spare wheel. #85. White, black, red. Color optional.

DEALERS!

Wire Wheels are sellers! Get particulars of wire wheel service and sales agent's propositions.

Ford distributors and accessory dealers should write for service and sales proposition for HOUSE Wire Wheels for Ford cars.

Wire Wheel Corporation of America
Successors to Hook Mfg. Co.
835 Eleventh Ave. at 57th St. New York



One of America's Great Trucks

Strength and ruggedness for city and inter-city hauling—an abundance of power for any emergency—dependability that keeps it a stranger to repair shops. These are the built-in qualities of

ONEIDA TRUCKS

They are qualities which rank it as one of the great trucks of America.

DEALERS! Write or wire
Your territory may still be open

PROMPT DELIVERIES

ONEIDA MOTOR TRUCK COMPANY
GREEN BAY, WISCONSIN

1, 1½, 2, 3½
and 5-Ton
Models
All Worm
Drive



Eastern Factory Branch, 211 W. 19th St., New York. Central Western Factory Branch, 1628 Harmon Place, Minneapolis. Minn. California Distributors, Runnels Motor Sales Co., 141-7 Grove St., San Francisco. Eastern Virginia Distributors, Oneida-Norfolk Truck Co., 786 Granby St., Norfolk, Va.

Are You Wise?

Do you know the detailed specifications of all passenger cars and motor trucks? Do you know the sizes and prices of all tires and tubes sold on the American market? Do you know the size and style of all electric bulb equipment for all passenger cars?

Every first of the month issue of Motor World presents the correct detailed specifications as above indicated. They are invaluable to men in the trade. Motor World is designed and edited for dealers, jobbers and garage owners exclusively. Published weekly. Fifty-two special and regular issues for two dollars per year. A big value—and getting bigger. Send your subscription to

MOTOR WORLD

239 West 39th Street, New York City



DRIVE A NAIL IN YOUR TIRE

SOUNDS FUNNY, DON'T IT?

But we are not camouflaging. After treating your tube with

PUNCTURENE

Inflate your tire and get your hammer *AND GO TO IT*. Puncturene seals the puncture instantly. Puncturene insures your tire against Punctures and Blowouts. Will keep your tires cool in summer; will not freeze them in winter. Write at once for guarantee and particulars. Agents wanted.

AUTO NECESSITIES CO.
AUSTIN, MINN.



Beauty of Glass a Factor in Selling Cars

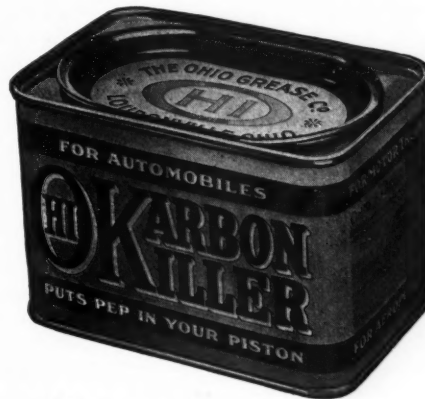
Manufacturers of automobiles realize the value of beauty as a sales factor. Consequently they demand glass of high quality—at a reasonable price.

Crystal Sheet Glass, while considerably less expensive than plate, possesses every element of beauty and quality essential to high grade automobile construction.

It is strong, uniform in thickness, perfectly transparent, and of the proper degree of flexibility.

Ask us to explain in detail why **Crystal Sheet** is the logical glass for your cars.

AMERICAN WINDOW GLASS CO.
World's Largest Producer
GENERAL OFFICES: FARMERS BANK BLDG.
Pittsburgh, Pa., U. S. A.



Ohio Karbon Killer

Keeps Spark Plugs, Valves, Pistons and Cylinders free from carbon—all the time.

Don't let your engine choke up with carbon until it can't run, and then remove it—Prevent it!

Put Ohio Karbon Killer in your gasoline, and prevent the formation of carbon, thus keeping your engine in the very best condition at all times.

Costs \$1.00 per lb., and a pound treats 480 gallons of gas. Get a can right now, and give your engine a chance. If your dealer cannot supply you, send your dollar to

THE OHIO GREASE COMPANY
Box 121, LOUDONVILLE, OHIO

At Our Risk— You Can Prove It

Don't waste good money on tire pumps that either break your back, or pump Rubber Rotting Oil particles or gasoline fumes into your tires.

Take No Chances

At our risk you can prove that the "Dead Easy" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power.

Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's "Dead Easy."

FREE TRIAL OFFER

Write today, NOW,
for fifteen day—no-money-in-advance—free trial offer.

GLOBE MANUFACTURING COMPANY
BATTLE CREEK MICHIGAN, U. S. A.



OLYMPIAN MOTOR CARS

Valve-in-head four cylinder motor
Forty-five horsepower
Twenty-five miles to the gallon

Write for detailed specifications and dealer proposition

THE OLYMPIAN MOTOR CAR CO.
PONTIAC MICHIGAN

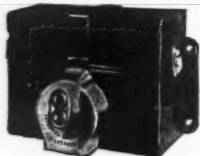


ATWATER KENT

SCIENTIFIC IGNITION

ADDRESS ALL COMMUNICATIONS TO
4934 STENTON AVE. PHILADELPHIA.

The DEFENDER



Sells for \$4.00

Worth the price of car

Is the "Standard" Ford Ignition Lock. Always demand the Defender, and take no imitations. The Defender safely locks the coil-box, and is the only lock that grounds the electrical system; this makes them thief-proof.

INSURANCE COMPANIES REQUIRE THE DEFENDER
AND ALLOW 15 PER CENT OFF ON INSURANCE

DEFENDER AUTO LOCK COMPANY
DETROIT, MICHIGAN

CENTURY

CRYSTALLIZED PLATE STORAGE BATTERY

Century batteries are built and sold for replacement only. They are standardized batteries with Universal Terminals. 6-V. 80-Amp. (square), 6-V. 80-Amp. (long), 12-V. 40-Amp. Just 3!! Think of it! Three! They replace 51 shapes and sizes and combinations of other makes of batteries and make 95% of all replacements. Universal Terminals means easy service. Standardizing means cheaper manufacturing.

Write us for particulars and territory

CENTURY STORAGE BATTERY COMPANY
DETROIT, U. S. A.

NO SPRING BURDEN



WHEN YOU USE
HIGGINS QUALITY SPRINGS

For Replacement

No hump—no hole—no bolt—no jolt. No center breakage. The one type that triumphs over all others—and all troubles. Made from best grade motor car spring steel of special analysis. Properly heat-treated. Rigidly tested. Rust and squeak proof. Fully guaranteed. For all cars. Speedy delivery. Big, constant customer getter and profit payer for dealers. Write for catalog J.C. 1917 and prices.

Dept. 21. HIGGINS SPRING & AXLE CO., Racine, Wis.

MR. DEALER

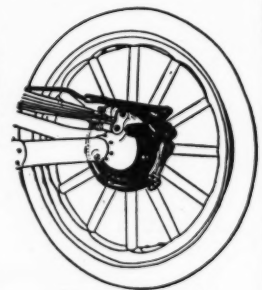
This morning's mail (July 1st) brought in repeat orders from dealers for 122 sets Pla-Safe Emergency Brakes. This is the best evidence in the world that our brake is a product of merit and is becoming one of the fastest selling Ford accessories on the market. Orders are coming in from all over the United States, as well as Australia, South America and Canada.

Price, \$10.00 per set

Write us today for our discount and big selling plan

The PLA-SAFE COMPANY

Successors to L. A. Leathers Co.
BROOKVILLE PENNSYLVANIA



Easy to install
No holes to drill

—is your crankshaft machining
satisfactory?



MOLTRUP'S EXPERIENCE—MOLTRUP'S METHODS

MOLTRUP'S MACHINERY—insure you absolutely accurate machining. And a new plant with increased capacity assures prompt delivery of large orders.

"MOLTRUP FOR QUALITY"

Moltrup Steel Products Co., Beaver Falls, Pa.

Guaranteed for 10,000 Miles Bricton Pneumatic Tires

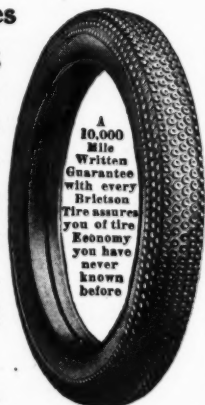
Every Bricton Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser. Bricton Tires are Puncture-Proof, and proof against blowouts, skidding, ruts, rim-cuts, oil and gasoline. Wonderful resiliency, easy riding qualities and economy commend them to every car owner.

Retread Your Present Tires—If your present tires are new, or if your tires have been used and the rubber tread has been worn off or thin, protect them with Bricton Treads and get greater service out of your tires and also make them puncture proof, oil proof, rut proof, gasoline proof and non-skid.

FREE TRIAL OFFER—To convince you Bricton Tires will give you satisfaction you may try them on your car at our expense. Write today for this Free Trial Offer, a copy of our guarantee and full information about Bricton Tires and Treads.

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1015 to 24 Woodmen of World Building
Dept. 1288 OMAHA, NEBRASKA



A
10,000
Mile
Written
Guarantee
with every
Bricton
Tire assures
you of tire
Economy
you have
never
known
before



\$7.50
List Price

FOR YOUR GARAGE

How do you keep your parts and tools? Scattered about—gathering dust and rust? Then you need a

HANDY SERVICE CABINET

Its 15 steel-body drawers will take care of those neglected parts and tools—keep them clean and instantly accessible. Made of strong, fumed oak. Mighty useful in the house, too.

At Your Dealer's or from
375 Broadway New York

STEVENS & CO.

STEVENS PRODUCTS

Delivery Problems Are Solved by
Standard **WORM DRIVE TRUCKS**



2, 3½ and 5 TON

Prompt deliveries of all capacities. Quality, price and demand insure good business. Write for our proposition
GOOD TERRITORY OPEN

STANDARD MOTOR TRUCK CO., Detroit, Michigan



THIS name on any tire insures greatest satisfaction. The exactness of construction and the quality of materials have made Firestone the biggest word in tire building.

FIRESTONE TIRE & RUBBER COMPANY
Firestone Park, Akron, Ohio Branches and Dealers Everywhere!



ON TRUCKS, to lengthen their "first life" without breakdown or interrupted service, these genuine oil-less bushings are installed.

BOUND BROOK & NIGRUM
TRADE MARK REG. U. S. PAT. OFF.
OIL-LESS BUSHINGS

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

BOUND BROOK OIL-LESS BEARING CO.
Specialists in the manufacture of Oil-less Bushings for more than a third of a century
Bound Brook, New Jersey

BUILD UP BIG BUSINESS—MAKE BIG MONEY

Open a tire repairing shop. Men starting without experience—now making big money. We instruct you free. Outfit pays for itself. We have 1,000 more vacancies to fill. Golden opportunity.



But be sure—get the RIGHT Outfit. There is but one that operates upon CORRECT principle—the

Vanderpool Vulcanizer

Only vulcanizer recommended by leading tire factories because the only one that repairs tires EXACTLY as THEY WERE MADE.

VANDERPOOL CO.,
SPRINGFIELD OHIO
In answering, address Dept. B.

Selden Trucks
Light Delivery 1, 2, 3½ and 5-Ton

Write for full information on the Selden Line



DEALERS: Write or wire for desirable territory

Selden Truck Sales Company
Rochester, N. Y., U. S. A.



ZENITH CARBURETOR

KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U. S. A. Chicago

More **BUSINESS AS USUAL**

The dealer who pushes Gordon fabric equipment will certainly feel no slump in his business during the coming year. We claim that there is more business to be had by a progressive Gordon dealer during the next several months than ever before.

If people cannot get new cars, help them dress up their old cars. Gordon top recoverings, seat covers, tire covers, radiator and engine robes will be in greater demand this season by discriminating motorists than ever before.

If you are now handling the Gordon line, push it harder than ever. If you do not handle the Gordon line, write us for dealer's Sample Book and liberal discount NOW.

The J. P. Gordon Company
308 No. 4th St. Columbus, Ohio

Turn Waste Space And Spare Time Into Big Profits

Ask For
Catalog No. 4.

Recharging Batteries

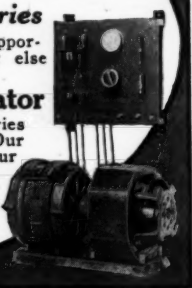
offers garage men a bigger opportunity for profits than anything else they can do.

Our 3-G Motor Generator

charges from one to eight 6-volt batteries at one time. Anyone can operate it. Our 9-G Generator charges one to twenty-four batteries at a time.

There are over 8,000 of our vibrating type Battery Chargers in use. Write for particulars.

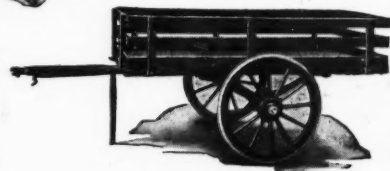
ST. LOUIS ELECTRICAL WORKS
4057 Forest Park Boulevard
St. Louis, Mo.



Jackson Auto Trailers

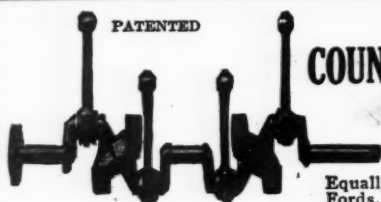


Built by men who are pioneers in the industry, of the best materials obtainable, and sold at a price that is right.



Built in six different models, a size for every load and car. Write us for our dealer's proposition and complete information.

THE MILES MFG. CO. DEPT. 10 Jackson, Mich.



PATENTED

DUNN'S COUNTER BALANCES Make Ford Motors Run Smooth

Equally necessary on Racing Fords, passenger models, delivery cars and tractors. They add enough to life of the motor to pay for themselves quick. They positively give more speed, more power, greater economy. More than 1000 Fords are now equipped, and every user satisfied. More than half of the orders received are repeat orders, coming from those who have tried them and know. Installed with a wrench.

Big Ready Sellers. Price \$12.00 per Set

Liberal Discount for Dealers and Jobbers

Write for our proposition and free illustrated literature

DUNN COUNTERBALANCE CO., Motor Dept. Clarinda, Ia.

Dunn Counterbalance Sales Co., of California
1220 San Pedro Street Los Angeles, Cal.



Pat. 2-6-17

Gas expelled to the rear through patented flared opening, prevents all back pressure. Lever has seven adjustments, which make easy installation. Spring is away from the body of Cut-out, does not absorb heat, has a simple tension adjustment and easy action, no strain on the exhaust pipe.

Ends accurately machined for pipe size and fitted with set screw, which insures a permanently rigid installation.

Sizes—1½" to 3¼"
Prices—\$4.00 to \$6.00

N. A. Petry Company, Inc.
1309 Race Street Philadelphia



STARTING LIGHTING SYSTEMS

THE DYNETO shows greatest efficiency in both motor and generator. Type D. A. Motor develops a torque of approximately 15 pounds. Type C. A. Generator shows approximately 15 amperes.

A car-speed of 15 to 20 M. P. H. keeps batteries fully charged.

Starter always sure to start.

Lamps always bright.

Send drawings and specifications for our recommendation.

Special Outfits for Fords

DYNETO ELECTRIC CORPORATION, Syracuse, N. Y.

Steel Tires & Mud Chains



Old Tires
Covered
Completely

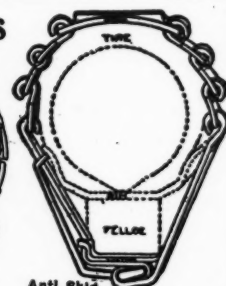


NO MORE PUNCTURES

Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Special Prices to Those in New Territory

Kimball Tire Case Co., 173 Broadway Council Bluffs, Ia.



Anti Skid

Mud chains can be put on in a fifty with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.



GUARANTEE VISIBLE PUMPS

Fast service, full measure and perfectly filtered gasoline, assure dealers the constant patronage of satisfied customers.

Write for the Pump Book

Guarantee Liquid Measure Company
Farmers Bank Bldg. PITTSBURGH, PA.

BURD

High Compression
PISTON RINGS
"The Accepted Standard"

BURD HIGH COMPRESSION RING CO.
ROCKFORD, ILLINOIS
Sales Offices in All Principal Cities.

Disco

DEPENDABLE PRODUCTS

Electric Lighting and Starting System For FORD Cars

You will be safe in buying or handling the Disco System, because it is made by the strongest company in this field. The financial and personal standing of the Disco organization is an absolute guarantee of satisfaction.

Let us prove this to you

DISCO ELECTRIC MANUFACTURING COMPANY
DETROIT

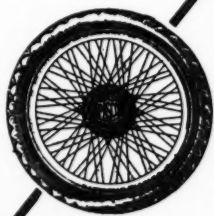


CHASE
Leatherwore
"As like the hide in most respects
in some respects its better"

The long-wearing, rich-appearing motor-car upholstery that can be used to better advantage than genuine leather.

L. C. CHASE & CO., Boston
NEW YORK DETROIT CHICAGO
Leaders in Manufacturing Since 1847

PASCO WIRE WHEELS



are best because of three exclusive patented features—

1. A tangent method of spoke lacing giving a stronger web.
2. The hub cap made of an indestructible metal—unaffected by jams and collisions.
3. The Safety Locking Device—locking the wheel on.

Pasco means Strength, Safety, Economy and Distinctive Beauty.

Write for dealer proposition

National Wire Wheel Works, Inc.
Geneva, N. Y., U. S. A.

The "Big Stick" That Brings Down Gasoline Expense

Up goes the price of gasoline! Maximum mileage is the big problem of the day! Solve it with the new Stromberg Carburetor.



New STROMBERG Does it!
CARBURETOR

The Official world's records made by the New Stromberg in gasoline mileage prove that you need the New Stromberg on your car. Mail coupon for details of how the New Stromberg will reduce your gasoline bills.
Stromberg Motor Devices Co., Dept. 27, 64 East 25th St., Chicago

No Lights! No Spark! Now What?

What if your electrical equipment should fail you on a black night, suddenly, without warning, on a bad part of the road? Don't let it happen! Put a



Weston
MODEL 354 AMMETER

On Your Dashboard or Cowl

It is the reliable means of determining the proper rate of charge or discharge of your battery for various speeds. It enables you to determine that the generator is working and that the storage battery is receiving its proper charge. Write us! Weston Electrical Instrument Co. 10 Weston Ave., Newark, N. J. 23 Branch Offices in the Larger Cities



THE Mercer shield is the badge of fastidious taste in automobiles. Mercer means the utmost in substantial smartness, riding comfort, and power. The possessor of a Mercer invariably feels a bit better satisfied than the owner of another car. Correspondence from dealers invited.

Mercer Automobile Company :: Trenton, N. J.
800 Whitehead Road

DEALERS
in pleasure cars will find in Winter Motor Trucks, "Unquestionably

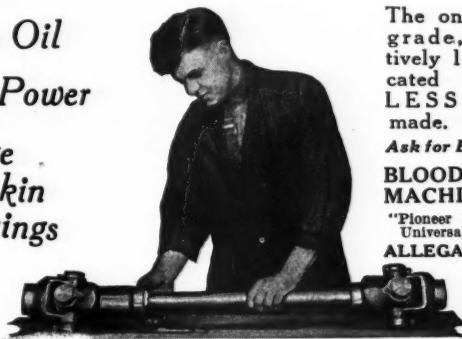
America's Foremost Quality Truck"—an addition to their line which will put profits back where they belong.



Blood Bros. Universal Joints

Save Oil
Save Power

Large
Workin
Bearings



The only high grade, positively lubricated "CAN-LESS" joint made.

Ask for Booklet E
BLOOD BROS.
MACHINE CO.
"Pioneer Makers of
Universal Joints"
ALLEGAN, MICH.

Save Gasoline!



—And Get More Profit

Save customers money and trouble—
increase motoring pleasure—and make
more profit by selling

ECON-O-KLEEN
IMPROVES GASOLINE—BURNS CARBON

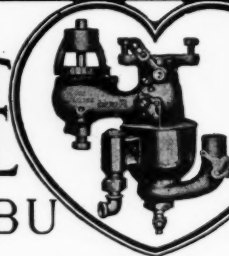
It helps solve your present day problem of help
shortage, increased overhead costs and grouchy
customers.

It adds oxygen to the gasoline mixture, burning it
clean. Guaranteed to clean out and prevent carbon—
to add 15% to 30% to gasoline mileage—to be abso-
lutely free from picric acid and other injurious chem-
icals. Send \$1 for trial can, prepaid. Treats 112 gallons.

Dealers Your customers will buy Econ-O-Kleen, and
repeat. Write for terms

ECON-O-KLEEN FUEL CO. 104 Labree Avenue
Thief River Falls, Minn.

SCH EBLER
CARBU RETOR



"The Heart of the Automobile"

THE WHEELER-SCH EBLER CARBURETOR CO. Inc.
INDIANAPOLIS • INDIANA

BOSCH
AMERICA'S SUPREME IGNITION SYSTEM



NEW YORK, CHICAGO, DETROIT, SAN FRANCISCO,
WORKS AND FOUNDRIES, SPRINGFIELD, MASS.

Elgin Six

"Car of the Hour"

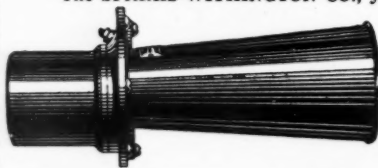
Has gained predominance in its price class by
unmatched performance. All that a motor car
should be, at a price that is surprisingly low.

117-Inch Wheelbase
Valve-in-Head Motor

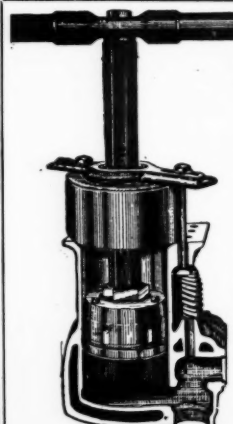
Elgin Motor Car Corporation, Argo, Ill.

SPARTON PRODUCTS
First Choice of
America's Best Cars

Sparton Motor-Horns—Hand-Operated and Motor-
Driven. Sparton Gasoline Vacuum Systems, Sparton
Honeycomb Radiators and Sparton Radiator Fans
The SPARKS-WITHINGTON CO., Jackson, Mich., U. S. A.



Pacific Coast
Representative
**NORMAN
COWAN CO.**
San Francisco
Calif.



Make More Profit
Storm Reboring Machine

by using

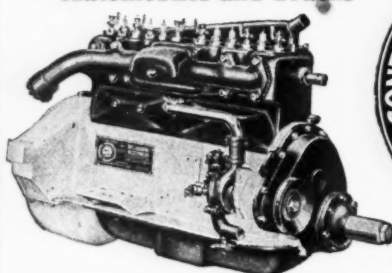
The most practical machine for any
type of motor. SIMPLE, SPEEDY,
ACCURATE and RELIABLE for
hand or power. No shop complete
without one. In daily use in all parts
of U. S. A. and foreign countries.
Shortage of new cars makes it indis-
pensable in large and small shops.

We furnish machines of varied capacities from 2½-
in. up. Also special Ford Machine. For sale by lead-
ing jobbers. Oversize pistons for all makes of motors.

For further information write to

Storm Manufacturing Company
Box 226 THOMPSON, IOWA

Standard Power for
Automobiles and Trucks



Continental Motors
Detroit Michigan

Presto Specialties

Cataloged and Sold by
Leading Jobbers and Dealers
Demanding by Car Owners Everywhere
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Four floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed regardless of hot, cold, wet or dry weather.

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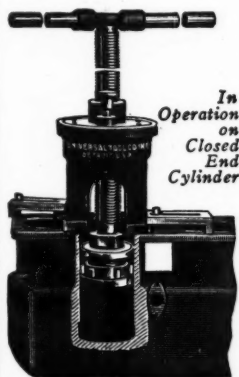
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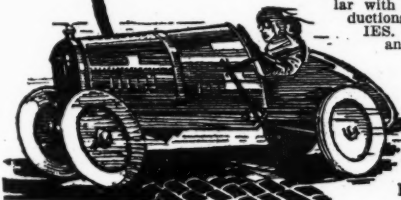
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Exhaust and Pins Assure Uniform Heat Treatment of All Fuel	This Hot-Pin Chamber Breaks Up All the Fuel NO WASTE	Exhaust Gases Heat the Pin Chamber, On All Sides
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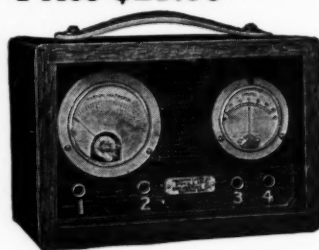
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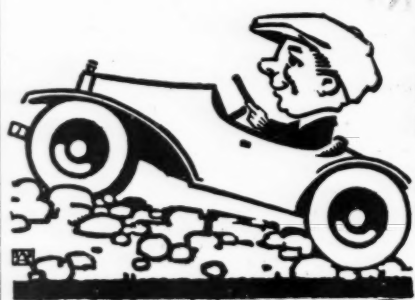
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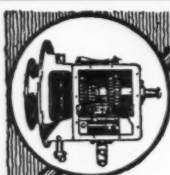
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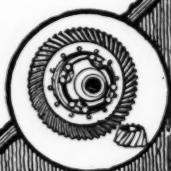


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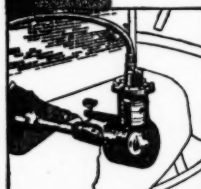
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ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

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No. 3**

SAVE 35 to 90%

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Thousands of other customers have saved this much. Why not you?

Used parts for any models of the
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Carter Car	Moon
Case	National
Chadwick	Nyberg
Chalmers	Oakland
Chase	Ohio
Cino	Oldsmobile
Cole	Overland
Crow-Elkhart	Packard
Dorris	Paige
Elmore	Palmer-Singer
E-M-F 30	Parry
Everett	Peerless
F.A.L.	Pierce-Arrow
Firestone	Pope Hartford
Flanders	Pope Toledo
Ford	Premier
Franklin	Rambler
Garford	R.C.H.
Gleason	Regal
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Great Northern	Schacht
Great Eagle	Seldon
Great Smith	Speedwell
Great Western	Stafford
Havers	Stearns
Haynes	Stevens-Duryea
Herff-Brooks	Stoddard-Dayton
Henderson	Studebaker
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All orders receive careful and immediate attention.

All shipments are inspected by men who know. Thus doing away with all unserviceable parts.

The shipment of only good parts, coupled with our unsurpassed quick service, at the right prices, will mean satisfaction to you and us.

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Used Parts for 300 Makes of Cars

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Buick, Model 10	60.00
Buick, Model 25	90.00
Case, Model 40	75.00
Cadillac, Model 1914	150.00
E. M. F., Model 30	50.00
Flanders, Model 20	50.00
National	75.00
Packard, Model 1909	85.00
Premier 6 cylinder	100.00
Reo 1910	60.00
Mitchell 6 cylinder	75.00
Overland 42	50.00
Overland 59	60.00
Velie	75.00
Marmon	90.00
Rutenberg	125.00
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UNIT POWER PLANTS

Chalmers 6, 1913	\$125.00
Haynes	90.00
Hudson 6, 54	175.00
Hudson 37	150.00
Imperial	100.00
Krit	90.00
Velie	125.00

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NEW SUPPLIES (Below Market Price!)

Motor Driven Klaxet Horns, each	\$4.00
Electric Head Lights for Fords, pair	3.75
Head Lamp Doors for Fords, each	.65
Vulcanizer Kits, each	.75
3-in. Innershoes, each	.30
3½-in. Innershoes, each	.34
Axle Shafts for Fords, each	1.40
Electric Side Lamps for Fords, pair	2.50
Oil Side Lamps, pair	2.75
A. Y. Hand Horns, each	2.25
Piston Rings for Fords (lap joint), each	.11
Piston Rings (all sizes), each	.30
Patches (for tube), box	.10
Spark Plugs (special), each	.25
Brake Shoes for Fords, each	.25
Body Polish (best), bottle	.45
Brake Lining, 1½-in., foot	.36
Brake Lining, 1¾-in., foot	.38
Brake Lining, 2-in., foot	.41

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Genolite Ignition Systems (Fords)	\$18.00
Remy Ignition Coils	6.50
Wagner Starters	15.00
Autolite Generators	18.00
Taper Pins	
Lock Washers	
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PLAY SAFE!

You lose nothing
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We guarantee every
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refund your money.

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Flanders 20	50.00
E. M. F.	50.00
Studebaker 25	50.00
Studebaker 4-15	75.00
Overland 56	75.00
Overland 69	75.00
Overland 6, Continental	100.00
Peerless 45 H. P.	50.00
Partin Palmer	50.00
Firestone Columbus	60.00
Mitchell 4-40	75.00
Stoddard Dayton 30	60.00
Stoddard Dayton 45	75.00
Case 1911	75.00
Cadillac 1911	75.00
Cadillac 1912	75.00
Kissell 40	75.00
American 30	75.00
Moon 1912	75.00
Stearns 1911	75.00
Henderson 4 cyl.	75.00
Buick 19	85.00
Locomobile 1910	90.00
Chalmers 6, 1915	100.00
Apperson 8 cyl.	100.00
Packard 6-48, 1914, with Starter, Generator and Bosch Magneto	300.00

UNIT PLANTS

Haynes, 1910, Unit Plant	\$75.00
Chalmers model 17	100.00
Menominee Truck	100.00
King 1914	100.00
Auburn 1914	100.00
Elcar 1916	125.00
Allen 1916	125.00
Paige 6, 1917	200.00

STARTERS

Gray & Davis, Maxwell	\$17.50
Remy, Mitchell 4-6	15.00
Ward Leonard	15.00
Auto Lite	12.50
Wagner	20.00
Bosch Fly Wheel Type	25.00
S-202, less fly wheel ring gear; Jesco	
16-volt	20.00

GENERATORS

Auto Lite	\$17.50
Gray & Davis	20.00
Ward Leonard	15.00
Vesta	12.50
Beardon	12.50
Apple	12.50
Eskridge	12.50

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Splitdorf Dixie	\$20.00
Mea	25.00
Bosch D-4	17.50
Bosch N-U-4	20.00
Bosch D-R-4	25.00
Bosch D-U-4	30.00
Bosch D-6	25.00
Bosch D-R-6	35.00
Bosch Z-R-6 and coil	50.00
Bosch Z-R-4 Dbl. Distb.	125.00

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Rear Axles	\$25.00 to \$50.00
Front Axles	5.00 to 15.00
Radiators	10.00 to 20.00
Transmissions	25.00 to 50.00
Bearings	.50 to 5.00
Springs	1.50 & 2.50
Spring Leaves	.25 & .50
Gears	1.50 to 15.00
Axle Shafts	2.00 to 10.00

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O.**The War Has Not Affected the Price of Used Parts**

Realizing that more cars are in service today than ever before, and those not in service in ordinary times are now being repaired we claim as before, to save you

50% or More
Off Manufacturers' List Price

A Few Bargains in Motors

Buick 31, Unit power plant, 1913...	\$100.00
Cadillac, 1910.....	50.00
Everett 30.....	50.00
Overland 79, 1914.....	50.00
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Studebaker Four, 1916, Series 17....	50.00

And many others.

Transmission Cases For:

E. M. F.	Buick 16-17-25-35
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Packard 30, with transmission, excellent condition.....	\$75.00
White Steamer, two-speed, suitable for Ford truck.....	20.00
Chalmers Six, 1918—Master Six, Model 36, Model F. National, 1913.	

A full line of Cylinder Blocks and Radiators. Reground Ball Bearings at 50% off new price. Overland Rear Axle Housings for Models 59-69-79.

Crank Cases For:

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Give us all information possible with your first letter. Give make, model, year, dimensions, or send in old parts. Parcel post shipments are quickest.

Make your inquiry an order and save time.

**OUR GUARANTEE
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Money returned immediately if we can not fill your order, or refunded if parts are not satisfactory. Write, phone, wire today. We offer unsurpassed service.

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Rapid Fire Service and Lowest Prices ON GOOD SERVICEABLE PARTS FOR ALL CARS

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UNIT POWER PLANTS

4 cyl. Continental—complete.....	\$100.00
4 cyl. Milwaukee—complete.....	100.00
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1914 Premier with starter.....	150.00
4 cyl. Chalmers 30.....	65.00
6 Stevens-Duryea—complete.....	150.00
4 cyl. 1913 Abbott-Detroit with starter and generator.....	150.00

300 new Adjustable T Bumpers, nickel or black, fit all cars except Fords.....\$4.50 each
14,000 ft. new radiator hose, price per ft., 1-in., 20c; 1½-in., 25c; 1½-in., 30c

1914 Allen.....	\$115.00
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1915 6 cyl. Master Chalmers.....	150.00
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Buick 35.....	100.00
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Liberal allowance made on your old motor

Cylinder Blocks, Pistons, Shafts, etc., for most all motors

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DU4 Bosch Set Spark.....	\$18.00
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We carry in stock all magneto parts

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Ward Leonard.....	12.00
Remy.....	18.00
Vesta.....	12.00
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STARTERS

Gray & Davis.....	\$15.00 to \$20.00
Remy.....	15.00
Ward-Leonard.....	20.00
Auto Lite, Bendix Drive.....	25.00
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Silent Starter and Generator Chains; all lengths and sizes.

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Special 12-in. face, two bulb type.....	4.00
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50 to 75 exceptionally good used cars at prices so low that they would even interest dealers.

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We wreck many cars every day and thus obtain great quantities of exceptionally good Tires and Tubes at prices that will interest you.

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Springs.....	1.00 to 3.50
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We Save You 50 to 80% of the Original Cost

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Bosch DU4 & 6 Variable.....	20.00
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Bosch D4	12.00
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Bosch ZR6 with coil.....	35.00
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Coils, Generators and Starters. Silent Starter and Generator Chains, all lengths and sizes.	

Lighting and Starting Batteries, \$6.00 to \$15.00	Springs
Carburetors	Transmission
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Rear Axles	Differential Gears
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Pistons, Cylinder Blocks,, Crank and Camshafts, Radiators, etc.
Many good motors in stock.
Tell us your needs

In wrecking cars we obtain and always have for sale a complete stock of parts for all makes of cars. Also tires and tubes whereby we can save you from 50 to 80 per cent

OUR SLIGHTLY USED TIRES AND TUBES

MEAN ECONOMY TO MOTORISTS :: A TRIAL WILL CONVINCE YOU

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$4.00	\$1.35	32x4.....	\$7.00	\$1.60	35x4 1/2.....	\$8.50	\$1.80
30x3 1/2.....	5.00	1.45	33x4.....	7.75	1.70	36x4 1/2.....	8.75	1.85
31x3 1/2.....	5.25	1.50	34x4.....	7.75	1.70	37x4 1/2.....	9.25	1.90
32x3 1/2.....	5.50	1.50	35x4.....	8.00	1.75	35x5.....	9.50	2.00
34x3 1/2.....	6.00	1.60	36x4.....	8.00	1.75	36x5.....	9.50	2.00
31x4.....	6.25	1.65	34x4 1/2.....	8.25	1.75	37x5.....	10.00	2.20

SPECIAL—Four 41x5 Tires, Rims and Tubes, \$80.00

PROMPT ATTENTION TO MAIL ORDERS

No Mileage Guarantee on Used Tires

Deposit Required with All Orders

MOTOR SALVAGE CO., 1425 State St., Chicago, Ill.

BUY YOUR USED PARTS FROM THE LARGEST
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50 to 80% Off List Price

Crank Cases\$10 to \$75 } Cylinder Blocks\$ 5 to \$40
Crank Shafts 5 to 35 } Radiators 10 to 40

Gears — Bearings — Springs

Our stock of the above parts is practically complete. Lamps, Tires, Carburetors, Magnetos, Coils, Wheels, Rear Axles, Motors. Anything for the automobile.

Money refunded if goods are unsatisfactory

ROCHESTER AUTO PARTS, INC., 135 Culver Rd., ROCHESTER, N. Y.

Detroit and Briggs-Detroit Motor Car Owners Notice

During the past several months, owing to financial difficulties of the former management, there has been considerable confusion as to where Detroit and Briggs-Detroit repair orders should be sent.

With our acquisition of the Detroit Motor Car Company, however, this condition is entirely overcome, and in the future all Detroit and Briggs-Detroit Service will be given direct from our factory at Detroit.

Therefore, to insure prompt attention and handling, repair orders and correspondence must be addressed (as before) to

DETROITER MOTOR CAR CO.
584 Franklin St. Detroit, Mich.

WIRE WHEELS

New, Rebuilt, Repaired

SINGLE WHEELS OR SETS

All Makes, All Sizes

PARTS AND TOOLS

Quick Delivery, Best Prices

We are prepared to meet any emergency arising out of the use of wire wheels.

WIRE WHEEL REPAIR CO.

146 W. 55th St., New York City

MOTORS and GENERATORS

A. C. Motors—1/4 H. P., \$15.00; 1/2 H. P., \$35.00.
Battery Charging Sets—100 Robbins & Myers, new machines, \$30.00 each and up. Charging and Lighting Generators, \$10.00 and up. A. C. Motors, 1 and 3 phase, up to 5 H. P., for immediate delivery. Bankruptcy stock. Less than 1/2 price. Write for bulletin 39.

JOHNSTON, West End, Pittsburgh, Pa.

Real Bargains with PURITAN QUALITY for the Motorist

Piston Ring Special Prices

We have rings of every size for any car.
High grade rings up to 5 inches,
in dozen lots at.....\$30.25 each
High grade rings 5 inches and over,
in dozen lots at......45 each

New Made-to-Order One-Man-Tops

We make the low, graceful, one-man top to fit any car. It can be easily put in place, as it fits the old top fittings.

5-passenger one-man Mohair Top.....\$45.00
7-passenger one-man Mohair Top..... 47.50
Roadster one-man Mohair Top..... 27.50
Ford Touring one-man Mohair Top..... 30.00
Ford Roadster one-man Mohair Top..... 25.00

These prices include the complete top, storm curtains, top duke proof boot with special attachment for connecting top to any wind shield.

New Tops for Old Ford Frames

These outfits consist of new, heavy 32-ounce rubber roofing—quarters, back curtains, with celluloid lights, back stays, all stitched and ready to slip over the old top frame.

For all models—Ford Touring Cars.....\$12.00
For all models—Ford Roadsters..... 9.00

Ford Side Curtains Special Price

For regular Ford top—Touring type.....\$10.00
For regular Ford top—Roadster..... 7.00
Made of best 32 ounce high grade rubber.

Dealers should write for special prices on tops and curtains.

Hartford Shock Absorbers

Complete set of two front and two rear absorbers with fittings ready to attach—for immediate delivery. For Packard, Cadillac "8", Hudson Super-Six

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We can make fittings for many other cars and make delivery in 10 days. It is necessary for us to have the model type and the year as well as the name of the car in order to insure a perfect fit, at \$25.00 a set.

Extra Values in Casings and Tubes

These casings are factory seconds that will give excellent service. Both the casings and the tubes are good values and will go fast—better order early. They are without mileage guarantee.

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30x3 —Smooth tread.....	\$10.00
32x3 1/2 —Non-skid.....	14.95
31x4 —non-skid.....	20.00
33x4 —Non-skid.....	21.70
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30x3 1/2 —Non-skid, Ford size.....	14.50

TUBES	
30x3 —Heavy grey tubes.....	\$ 2.50
32x3 1/2 —Heavy grey tubes.....	3.85
31x4 —Heavy grey tubes.....	4.65
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48 PURITAN BUILDING
415 Lafayette Blvd., DETROIT, MICH.

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FOR 100 MAKES CARS

From 1909 to 1917 inclusive

Money Refunded if not Satisfactory

IN FULL ASSEMBLY

We have Motors, Carburetors, Full Floating Rear Axles, Magnetos, of all standard cars

SHIPMENTS MADE PROMPTLY

50 to 90% Off Manufacturer's
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WE WANT YOUR BUSINESS

Write today for prices.

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USED For Any Make or Model Car
50 to 80% Off Mfgs. List.

PARTS Motors, Magnetos, Radiators
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PULLMAN NEW PARTS FOR PULLMAN CARS
OWNERS A Complete Line of All Parts AT A GREATER SAVING!
ATTENTION! We Undersell Them All!

PULLMAN AUTO PARTS & SERVICE COMPANY
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USED FOR ALL MAKES OF CARS!
1/4 to 3/4 Off Mfgs. Price List.

PARTS Complete Motor or Parts for Same
GEARS MAGNETOS AXLES
Radiators, Carburetors, Transmissions

ANY PART! LOWEST PRICES! WRITE TODAY!

SEIGEL AUTO WRECKING CO.
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"We Sell the Best—Junk the Rest"

Parts and Repairs.

LOZIER REPAIRS

All orders for Lozier replacement parts are now being filled from our plant at Detroit—and nowhere else. We have discontinued all branch repair stations. In the future, all service correspondence and orders must be forwarded direct to us, as we do not guarantee the quality or accuracy of repairs purchased in any other way.

LOZIER MOTOR CO.
Detroit Michigan

Parts and Repairs.

WICHITA AUTO WRECKING CO.

805-809 W. Douglas Ave.

EXCEPTIONAL VALUES IN MOTORS

We have parts for the following cars:
American Underslung
Auburn 30-40
Buick F-10-16-17-19-25-28-29-30-31
Burg 40
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Cameron—Crawford
Detroit—Enger 40
E. M. F. 30—Fal Car
Flanders 2 & 3 speed
Firestone Columbia
Fuller
Ford—N. R. & S.
Great Northern
Halladay—Haynes 1910
Hershehoff—Hupp 20
Hudson 20
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Jackson 2 & 4 cylinder
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Kissel Kar 40
King—Knox 40
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Lexington 40
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Marathon 30-40
Maxwell 2 & 4 cylinder;
K-Q-25—Mitchell 40
Moon 40
Mason "May Tag" 4 cyl.
Monarch 40—Moline
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Overland 30-32-35-38-41-42-52-56-59-69-71-75BR-79-81-83
Oldsmobile 40
Oakland 2 & 4 cyl. 30-40
Packard 1910—Premier
Paige Detroit 25 H. P.
Pullman 40
Reo 2 & 4 cyl. 4th & 5th
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Complete Motors, Transmissions and Rear Axles. Money refunded on all parts within 10 days if unsatisfactory.
Buy your parts in WICHITA, KANSAS

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Parts 50 to 80% off List

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Carter Car	Krit	Pierce Arrow
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Clark	Little	Rambler
Cole	Lyons-Knight	Reo
Columbia	Lozier	Richmond
Continental	Locomobile	Sampson
Cutting	McFarlan	Silent Knight
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AUTO SAVE 50-90% FOR 400 CARS PARTS

POPE, PACKARDS, PIERCE,
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Motors\$25.00 up	Presto Tanks.\$ 4.50 up
Magnetos 4.00 "	New Spotlights 1.00 "
Carburetors .. 3.00 "	Generators .. 10.00 "
Rear Axles... 15.00 "	Gears 1.00 "
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Cylinders 5.00 "	Radiators 10.00 "

Jobbers in Bankrupt Auto
Supplies

BRIGHTMAN AUTO EXCHANGE

84 Wooster St., Hartford, Conn.

SUMMER CLEARING SALE

4 pass. Chummy, with top and shield dash 33 in. wide, 106 in. long, worth \$350.00.....\$125.00
5 pass. Drexal, with top and shield 93 1/2 in. long, painted, worth \$300.00.. 125.00
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New Parts for ORPHAN CARS

We make a specialty of furnishing new gears and axle shafts, axles, repair parts for motors and transmissions for cars that have been discontinued.

CUTTING MOTOR CARS

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(All cars using same)

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GUARANTEED PARTS

Half List Price—Genuine Packard, Cadillac, Buick, and other parts, all good as new. Goods shipped inside of 24 hours.
Your money's worth or your money back.

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For FORDS—Something New and Different
The new ROYAL RADIATOR SHELLS and HOODS change your old Ford into a 1918-looking model.
Special SPEEDSTER BODIES, HOODS, FENDERS, RADIATORS, made to order

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Gears, Axles, Bearings, Carburetors, Generators, Parts. Cleveland's leading parts dealer and Auto wrecker.

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OTHERS SAVE! WHY NOT YOU?

Almost 50% Saved on Your
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Write Us for Price List

NEW TIRES USED TIRES
DOUBLE TREAD TIRES

SERVICE AND SATISFACTION GUARANTEED
—PARTS FOR ALL AUTOMOBILES—

Gears, Shafts, Bearings

Write us your needs

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Rear Axle Bevel Gears and Pinions
These Are All New Parts

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SPEED SPECIALTIES—FORD

Underslung parts for Fords, complete with instructions, per set.....\$20.00
Counterbalances for the Ford crankshaft, per set 12.00
Speedway racing bodies..... 29.50
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GEARS

For Transmissions and Differentials.
Shafts and Pins.

SERVICE GEAR & MACHINE CO.

"Manufacturers for the Trade"
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AUTO PARTS CO.

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ALL PARTS for all makes of cars, 50% OFF.

USED PARTS

LARGE STOCK OF USED PARTS FOR ALL CARS

Write us today. Give name of car and model.

LOUISVILLE AUTO PARTS CO.

518 E. MARKET ST. LOUISVILLE, KY.

"Satisfaction guaranteed or money refunded"

Rims—All New and Old Types

and parts for all makes of rims. Get my prices on spare rims, locking rims, side rings, for any make of car. Quick service. Free rim information.

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ATTENTION! MARION OWNERS

Parts for All Models

SAVE YOUR MONEY—Buy your Transmission and Differential Parts from us, 30% discount allowed from list on all rear axle parts.

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RIMS RIMS

All Makes and Kinds

Parts, Side and Lock Rings, Bolts and Wedges.
Dealers, write for prices

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AUTO PARTS

Why pay full price when we can save you, on slightly used parts

50 Per Cent to 75 Per Cent

Solid Tires and Wheels, usable for Trucks and Trailers. Prices reasonable. MOTORS—\$40 to \$100. Write for specifications.

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Parts and Repairs. Rebuilding and Repairing.

PARTS
For Practically All Makes of Cars
60 per cent to 85 per cent off list price.
Send in your old parts for duplication. Write us
your needs and get our price before buying else-
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Makes
WHEELS REBUILT AND REPAIRED
COMPLETE CATALOG FOR DEALERS
CHICAGO WHEEL AND RIM CO.
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PARTS FOR ALL CARS
50% to 80% off Mfrs. List Price. First class used parts.
Large stock of parts for White and Keaton cars. Motors:
Regal, \$50; Metz, \$65; Buick 4, \$90; Waukesha, \$125.
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of carburetors, gears, axles, radiators and all parts.
Large stock of used tires.

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USED PARTS FOR SALE
Brush, Buick 2 cyl. 10-16-17-19-25-25C-27-30-31-35-
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Empire 31, Hudson 20-33, Krit 12, Kissel Kar 10, Max-
well 2 cyl. Mascot & Special; Metz 22, Mitchell, 11-12-
14 4-cyl., 14 Big 6; Moline 9, Oakland 35-40-42, Over-
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Cylinders Reground

Over 800 Piston Patterns Always in Stock.

Our Expert Mechanics and our Highest Grade Equipment are your guarantee for highest class workmanship.

Our Special Light Alloy Pistons will give you More Power—More Speed; we also do Gear Cutting of Spur and Bevel Gears.

Write to Us Today

Auto Engine Works
St. Paul, Minn.

CYLINDERS REGROUND

Sixteen years' experience in cylinder regrounding enables us to offer you the highest grade of workmanship at reasonable prices.

\$5.00 to \$10.00

Per cylinder, including pistons and rings

\$12 Special Ford Job

MANUFACTURERS OF PISTONS AND RINGS

Crown Machine Shop
CROWN POINT INDIANA

Rebuilding and Repairing.

Cylinder Grinding

on special highest grade cylinder grinding machinery. No make-shift tools. Work handled by men with automobile factory experience. Large assortment of patterns for iron pistons. Complete stock of piston rings. Prompt service. Highest grade work only, fully guaranteed.

Aluminite Pistons and Aluminite Connecting Rods

Aluminite piston will put six cylinder smoothness into a four cylinder motor; improve a six or eight, give more power and quicker get-away. For prices, state make, model and year. Piston pins, aluminite connecting rods and racing motors.

For Tractors, these pistons will greatly increase the efficiency of the motor and save the bearings.

Power-Plus Cylinder Heads

For Ford Cars

Keep the Motor Cool

Give More Power and Speed

Motors

Complete stock—new and used—for all makes of cars. Every motor in perfect condition—no junk. We also build and overhaul motors, both automobile and aeronautical. Many a good car proves inefficient, due to motor trouble. We specialize in motor work, often changing a four-cylinder to a six, eight or twelve. Don't discard a car otherwise satisfactory because of motor trouble. Tell us your difficulty and let us solve the problem quickly, efficiently and at a reasonable expense.

Green Engineering Co.
Dayton, Ohio

Rebuilding and Repairing.

CYLINDER REGRINDING PISTONS RINGS PINS

Largest in Middle West

Our complete records give Permanence and Continued Service

BUTLER MFG. CO.

Established 1897

1115 E. Georgia Indianapolis

CYLINDERS REGROUND

including new pistons and rings. Any size—\$7 to \$8 per cylinder. All our work guaranteed. Quick shipments. Let us prove our ability on your next job.

NEUPERT MFG. COMPANY

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WE GRIND

Cylinders and fit special heat-treated Pistons. Welding of all kinds of Metals. Gear Cutting of all kinds.

PONDELICK BROS.

Largest Mfrs. of Duplicate Auto Parts in U. S.
Leavitt St. & Jackson Blvd. Chicago, Ill.

CYLINDERS REBORED

by our Expert Mechanics are PERFECT New Pistons and Rings fitted. Complete job from \$4.50 to \$9.50.

SEND YOUR WORK TO OTTUMWA

STAR AUTO & SUPPLY CO.

411 Church St. Ottumwa, Ia.

Scored Cylinders Repaired

We use the same pistons. General machine work for foreign and American cars. All parts duplicated. Welding of all metals. Manufacturers of Catelain Hose Coupling. Ever-Ready Starters. U. S. Shock Eliminators. Quick service, satisfaction guaranteed.

ANDRE CATELAIN

1446-8 Indiana Avenue Chicago, Ill.

CYLINDER GRINDING

High grade equipment assures best workmanship. Prices reasonable.

MANUFACTURERS OF TRUMP MULTIPLE PISTON RINGS

TRUMP MFG. CO.

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CRANK SHAFTS REGROUND
NOT FILED AND REGROUND—BUT
REGROUND ON SPECIAL GRINDERS!
CYLINDERS REGROUND
STAFFORD SUPREME SERVICE
STAFFORD MOTOR COMPANY
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Reground—We Weld Anything
Fitted with cast iron or light pistons;
leak-proof or plain piston rings.
Best equipped shop in the country.
Quick Service—Reasonable Prices—Gear Cutting
SIOUX CITY WELDING & MACHINERY CO.
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CYLINDER GRINDING

Piston Rings and Wrist Pins made to fit. All work guaranteed. Prices Right. Prompt Service.

Finest, Most Accurate Machinery BEST SKILLED MECHANICS

Modern Auto Repair & Reconstruction Co.
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Tires.

HIGH GRADE TIRES & TUBES

BEST VALUES ON THE MARKET
A Trial Order Will Convince You

Size	Plain	Tubes	Size	Plain	Tubes
28x3.....	\$ 9.00	\$2.00	35x4.....	\$21.70	\$3.75
30x3.....	8.75	2.00	36x4.....	22.35	3.85
30x3½.....	11.35	2.30	34x4½.....	25.65	4.15
32x3½.....	13.35	2.45	35x4½.....	26.75	4.20
34x3½.....	15.50	2.55	36x4½.....	27.20	4.30
31x4.....	17.45	3.20	37x4½.....	31.15	4.70
32x4.....	17.75	3.35	35x5.....	30.55	4.65
33x4.....	18.55	3.50	36x5.....	32.90	4.85
34x4.....	19.00	3.65	37x5.....	32.35	4.85

Add 10% for Non-Skid Tires

\$1.00 deposit required. Tires shipped by return express subject to examination. Specify whether Q. D., Clincher or Straight Side Rim. Plain or Non-Skid.

No mileage guarantee at these prices

ARMSTRONG TIRE & VULCANIZING CO.

1336 Michigan Ave. Chicago, Ill.
Branch: 1612 Michigan Avenue

Phones: Calumet 5212, Calumet 2199

USED TIRES

Best Values Ever Offered
for the Money

Size		Size	
30x3.....	\$4.00	36x4.....	\$ 8.50
30x3½.....	5.00	34x4½.....	8.75
32x3½.....	6.50	35x4½.....	9.50
31x4.....	6.50	36x4½.....	9.50
32x4.....	7.00	37x4½.....	10.00
33x4.....	7.50	35x5.....	10.00
34x4.....	8.50	37x5.....	11.00

All goods shipped promptly. \$1 deposit required with each tire ordered. Balance C. O. D., subject to examination, at the above prices, without a guarantee. Specify whether Clincher or Straight Side.

DEALERS—Get Our Prices on New Tires

ROYAL TIRE & SUPPLY CO.

1461 Michigan Ave. Chicago, Ill.

Phone Calumet 2553

Special Bargains in SLIGHTLY USED TIRES

The kind that will satisfy all customers.

30x3.....	\$4.00	34x4.....	\$ 8.00
30x3½.....	5.00	34x4½.....	8.25
32x3½.....	6.00	35x4½.....	8.50
31x4.....	6.50	36x4½.....	8.75
32x4.....	7.00	37x4½.....	9.50
33x4.....	7.75	37x5.....	10.00

Send \$1.00 deposit with each tire ordered. Balance C. O. D., subject to examination. Specify if Clincher, Q. D., or Straight Side.

No Mileage Guarantee at the Above Prices

American Tire & Vulcanizing Co.

Phone: Calumet 5170

2136 S. MICHIGAN AVE. CHICAGO, ILL.

HIGH GRADE TIRES AND TUBES

Factory Seconds, Unguaranteed, at Interesting Prices. Also complete line of Firsts.

Write Us Your Needs

ACORN TIRE & REPAIR CO.

1547 So. Michigan Ave. CHICAGO, ILL.

MANY FIRMS ARE GETTING business by telling of their facilities in these sections.

Why not you?

Full information gladly given
CLASSIFIED DEPARTMENTS
Motor Age, Mallers Bldg., Chicago

Tires.

TIRES & TUBES

SLIGHTLY USED AND FACTORY REPAIRED

TIRES AND TUBES—QUALITY ABOVE ALL

The QUALITY of our tires and tubes is superlative, the PRICE cannot be equaled and our SERVICE cannot be excelled.

A satisfied customer is our biggest asset, therefore we must satisfy you.

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.00	\$1.35	32x4.....	\$ 7.00	\$1.60	35x4½.....	\$ 8.50	\$1.80
30x3½.....	5.00	1.45	33x4.....	7.75	1.70	36x4½.....	8.75	1.85
31x3½.....	5.25	1.50	34x4.....	7.75	1.70	37x4½.....	9.25	1.90
32x3½.....	5.50	1.50	35x4.....	8.00	1.75	35x5.....	9.50	2.00
34x3½.....	6.00	1.60	36x4.....	8.00	1.75	36x5.....	9.50	2.00
31x4.....	6.25	1.65	34x4½.....	8.25	1.75	37x5.....	10.00	2.20

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly C. O. D., with privilege of examination. Specify style of rim to avoid delay.

Our slightly used tires bear no mileage guarantee; but in the event that they do not give service in proportion to the price, you may return them to us by prepaid express and we will cheerfully make a fair adjustment.

We carry a complete stock of New Tires—Write for Prices

LINCOLN TIRE & SUPPLY CO.

1463 S. Michigan Ave.

Chicago, Illinois

TIRES SPECIAL SPECIAL SPECIAL TUBES

ECONOMY TO MOTORISTS

Select Your Supply Now for The Season—Slightly Used and Factory Repaired
TIRES and TUBES—A Trial Will Convince You

Largest and most complete stock of slightly used tires in all makes for immediate shipment.—NO JUNK.

Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.00	\$1.35	35x4.....	8.00	1.75
30x3½.....	5.00	1.45	36x4.....	8.00	1.75
31x3½.....	5.25	1.50	34x4½.....	8.25	1.75
32x3½.....	5.50	1.50	35x4½.....	8.50	1.80
34x3½.....	6.00	1.60	36x4½.....	8.75	1.85
31x4.....	6.25	1.65	37x4½.....	9.25	1.90
32x4.....	7.00	1.60	35x5.....	9.50	2.00
33x4.....	7.75	1.70	36x5.....	9.50	2.00
34x4.....	7.75	1.70	37x5.....	10.00	2.20

Freight Prepaid on all orders exceeding \$50.00 when check in full accompanies order, otherwise \$1.00 deposit with each tire ordered. Specify style of rim to avoid delay.

Although at the above prices these tires bear no mileage guarantee, we will make reasonable adjustments should they prove unsatisfactory. All tires sent in for adjustment must be prepaid.

We also carry a complete stock of new tires. Write for prices

AETNA TIRE & SUPPLY COMPANY

1429 Michigan Avenue

Chicago, Illinois

PROMPT SHIPMENTS MADE

AUTO TIRES AND TUBES FIRSTS & SECONDS

EXPRESS PREPAID ON ALL ORDERS

At the following prices we give no mileage guarantee, but will make reasonable adjustment should tire prove unsatisfactory. All tires sent in for adjustment must be prepaid:

Size	Non-Skid. Tubes.	Size	Non-Skid. Tubes.	Size	Non-Skid. Tubes.
28x3.....	\$ 8.00 \$2.00	31x4.....	\$16.45 \$3.10	34x4½.....	\$22.95 \$4.05
30x3.....	8.45 2.20	32x4.....	16.95 3.25	35x4½.....	23.60 4.15
30x3½.....	11.30 2.40	33x4.....	17.25 3.40	36x4½.....	23.95 4.25
31x3½.....	11.95 2.50	34x4.....	17.95 3.60	37x4½.....	24.95 4.35
32x3½.....	12.95 2.65	35x4.....	18.45 3.75	35x5.....	26.25 4.55
34x3½.....	14.45 2.80	36x4.....	18.95 3.90	36x5.....	27.00 4.75
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33x3½.....	13.40	7.50	2.35	35x4½.....	25.50	10.00	3.35
34x3½.....	13.45	7.50	2.50	36x4½.....	25.90	10.00	3.40
36x3½.....	12.65	7.50	2.65	35x5.....	27.00	12.00	4.00
30x4.....	14.20	7.00	2.70	36x5.....	26.60	12.00	4.10
31x4.....	16.65	7.00	2.75	37x5.....	30.10	12.00	4.20
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30x3.....	7.95	8.55	1.95	36x4.....	18.95	19.60	3.65
30x3½.....	10.35	10.95	2.30	34x4½.....	22.60	24.90	4.15
32x3½.....	11.65	12.90	2.40	35x4½.....	23.60	25.10	4.30
31x4.....	16.15	16.90	3.00	36x4½.....	23.90	26.60	4.40
32x4.....	16.55	17.30	3.05	37x5.....	30.75	31.45	5.30
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7,949 Ford Dealers, U. S.	\$20.00, or 4.00 per M.
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(Showing make of truck handled.)	
150,000 Truck Owners, U. S.	7.50 per M.
5,400 Truck Owners in Chicago,	
\$15.00, or	3.50 per M.
46,943 Garages, U. S.	3.00 per M.
55,967 Auto Supplies, Retail, U. S.	3.00 per M.
45,054 Repair Shops	3.00 per M.
404 Auto Mfrs.	3.00 per M.
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plies and Repairs in one list,	
no duplicates	3.00 per M.
1,502 Auto Supply Jobbers	\$5.00
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per M. Further particulars	

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Better take better care of gears and bearings—Use NON-FLUID OIL and gears will be always protected by cushion of lubricant; and bearings will not only get better lubrication, but will need less attention.

NON-FLUID OIL actually costs less per month for better lubrication.

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AN illustrated guide to points of interest in and around Buffalo and Niagara Falls. Free on request.

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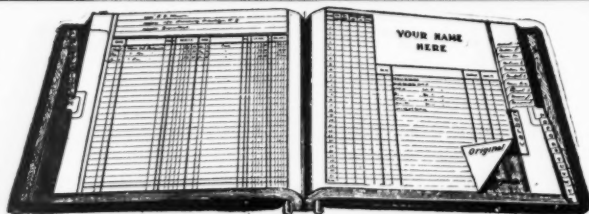
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Makers of Modern Business Systems for Garage and Supply Dealers.

12 Elm St.
New York

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Gentlemen: Please tell me exactly how your systems can help me in my garage (or supply store). Send this information without obligation to me.

Name
Address
City and State.....
MA

Special Offer

The coupon herewith is worth \$2.75 to you. That means that if you buy our system through this advertisement we shall rebate you \$2.75 from our printed list price. This offer stands good for the month of August, 1918.

Index to the

Accurate Systems and Manifold Company...	114
Advance Packing and Supply Company.....	96
Ahlberg Bearing Company.....	104
American Accessories Company.....	113
American Window Glass Company.....	97
Anchor Top and Body Company.....	56
Atcheson Graphite Company.....	113
Atwater-Kent Manufacturing Company.....	98
Auto Necessities Company.....	97
Automotive Wood Wheel Manufacturers' Ass'n	81

Barkoot, K. G.....	113
Bearings Company of America.....	103
Bergie National Spark Plug Company.....	104
Bethlehem Motors Corporation.....	113
Black and Decker Manufacturing Company....	75
Blood Brothers Machine Company.....	101
Bosch Magneto Company.....	102
Bound Brook Oil-less Bearing Company.....	99
Bower Roller Bearing Company.....	54
Bricton Manufacturing Company.....	98
Brown-Lipe-Chapin Company.....	104
Brunner Manufacturing Company.....	86
Burd High Compression Ring Company.....	100
Byrne, Kingston and Company.....	103

Camden-Anchor Rockland Machine Company...	113
Cassidy, Edward A., Company.....	50-94
Century Storage Battery Company.....	98
Chase, L. C., Company.....	101
Clearing House.....	104-113
Coe-Stapley Manufacturing Corporation.....	63
Commerce Motor Car Company.....	94
Continental Motors Corporation.....	102
Covert Gear Company.....	57
Curtis Pneumatic Machinery Company.....	91

Defender Auto Lock Company.....	98
Detroit Accessories Corporation.....	104
Disco Electric Manufacturing Company.....	101
Dunn Counterbalance Company.....	100
Dyneto Electric Company.....	100

Eclipse Machine Company.....	104
Econ-O-Kleen Fuel Company.....	102
Elgin Motor Car Corporation.....	102
Elkhart Carriage and Motor Car Company....	4
Ever-Tight Piston Ring Company.....	55

Fafnir Bearing Company.....	92
Firestone Tire and Rubber Company.....	99
Four Wheel Drive Auto Company.....	60

Gabriel Manufacturing Company.....	61
General Gas Electric Company.....	87
General Tire and Rubber Company.....	79
Globe Manufacturing Company.....	97
Goodrich-Lenhardt Manufacturing Company....	113
Gordon, J. P., Company.....	99
Gray and Davis.....	2
Guarantee Liquid Measure Company.....	100
Gurney Ball Bearing Company.....	115

Halladay, L. P., Company.....	90
Haney, J. H., and Company.....	95
Hartford, Edward V., Incorporated.....	104
Haywood Tire and Equipment Company.....	90
Herschell-Spillman Company.....	78
Hession Tiller and Tractor Company.....	89
Higgins Spring and Axle Company.....	98
Hill Pump Valve Company.....	2d Cover
Hollenden Hotel.....	92
Hoover Steel Ball Company.....	92
Howe Manufacturing Company.....	Back Cover

J. and D. Tire Company.....	76
Jenkins Vulcan Spring Company.....	103
Jewell Electric Instrument Company.....	93
Johnson Company.....	84
Johnson, S. C., and Son.....	1
Joliet Oil Tractor Company.....	116

Advertisements

K. B. C. Company..... 103
Kellogg Manufacturing Company..... 113
Kimball Tire Case Manufacturing Company.... 100

Lalley-Electro Lighting Corporation..... 74
Lenox Hotel..... 114

McCord Manufacturing Company..... 85
McQuay-Norris Manufacturing Company... 3d Cover
Mercer Automobile Company..... 101
Metal Specialties Manufacturing Company.... 102
Miles Manufacturing Company..... 100
Moltrup Steel Products Company..... 98
Motor World..... 96
Mutt, L. J., Company..... 91

National Wire Wheel Works..... 101
New Departure Manufacturing Company..... 77
New York and New Jersey Lubricant Company. 113
Niehoff, Paul C., & Company..... 95
Norma Company of America..... 3
Norwalk Tire and Rubber Company..... 59

Ohio Grease Company..... 97
Olympian Motor Car Company..... 98
Oneida Motor Truck Company..... 96

Paco Manufacturing Company..... 103
Petty, N. A., Company..... 100
Phillips-Brinton Company..... 72
Phillips Engineering Company..... 104
Pla-Safe Company..... 98

Redden Motor Truck Company..... 65 to 68
Ross Gear and Tool Company..... 49
Russell Manufacturing Company..... 104

St. Louis Electrical Works..... 100
Schrader's Son, A..... 92
Selden Truck Sales Company..... 99
Shaler, C. A., Company..... 103
Sheldon Axle and Spring Company..... 82
Smith, L. E., Glass Company..... 94
Sparks-Withington Company..... 102
Splittorf Electrical Company..... 58
Standard Motor Truck Company..... 99
Standard Parts Company..... 52-53
Starkweather-Snook Corporation..... 69
Stevens and Company..... 99
Storm Manufacturing Company..... 102
Stromberg Motor Devices Company..... 101
Stutz Motor Car Company..... 62
Sunderman Corporation..... 80

Thermold Rubber Company..... 70
Triangle Motor Truck Company..... 51

U. P. C. Book Company..... 88
U. S. Ball Bearing Manufacturing Co.. Front Cover
U. S. Light and Heat Corporation..... 83
Universal Tool Company..... 103

Vanderpool Company..... 99

Waukesha Motor Company..... 64
Webb Jay Corporation..... 95
Weston Electric Instrument Company..... 101
Wheeler-Schebler Carburetor Company..... 102
Wheelless-Wilson Auto Supply Company..... 93
Winther Motor Truck Company..... 101
Winton Company..... 103
Wire Wheel Corporation of America..... 96
Wonder Sales Company..... 73

Young, L. A., Industries..... 71

Zenith Carburetor Company..... 99

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GURNEY BALL BEARINGS

Have Greater Load Capacity

Primarily this greater capacity is due to the peculiar design and patented method of assembling Gurney Ball Bearings, whereby a maximum number of largest possible size balls are inserted in continuous raceways without using a filling slot.

Then, too, the race contours are accurately ground to the curvature of balls—only about 4% larger, which gives the balls "area contact," so that each ball can carry about 26 times the load the same ball would carry on a flat surface.

We will be glad to explain other superior features of Gurney Ball Bearings.

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Gurney Ball Bearing Co.

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Jamestown, N. Y.



Powerful on Soft Ground

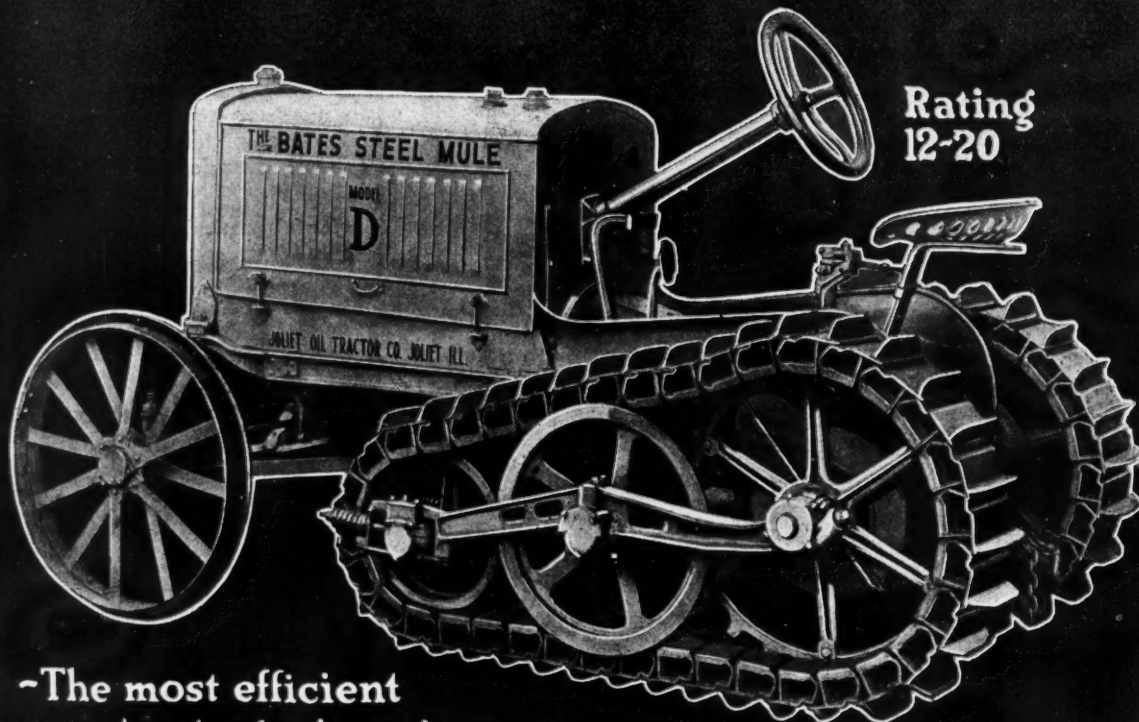
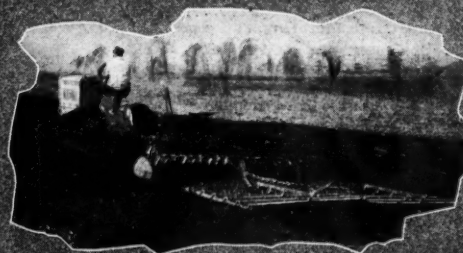
The twin crawlers of the Bates Steel Mule lay a firm runway on the soft ground, which runway is held from slipping by twenty-four cleats. This runway has a ground pressure of less than $3\frac{1}{2}$ pounds per square inch and, being geared to it, the tractor pulls as big a load on soft ground as it can on firm footing.

The absence of slipping is one of the many factors that go to make the Bates Steel Mule unusually economical in fuel.

This feature, combined with the unit construction, Timken roller bearings, hardened cut gears running in oil and heavy duty valve-in-head kerosene motor, contributes to the great efficiency of this tractor.

*Write for complete illustrated
descriptive literature*

JOLIET OIL TRACTOR CO.
332 Jackson Street Joliet, Illinois



**Rating
12-20**

**~The most efficient
tractor in America~**

Explosion

The piston rings must hold the terrific pressure of the explosion so that maximum power can be obtained. If the rings leak, power is lost and hot gas escapes into the crank case, causing excessive heating and oil deterioration.

Compression

Leaky piston rings allow part of the gas to escape, thus reducing compression. The result is a weak explosion and the gas that escapes by the rings condenses in the crank case and seriously diminishes the lubricating quality of the oil.

Exhaust

Good rings are necessary to thoroughly scavenge the cylinder on the exhaust stroke so that the combustion chamber can be completely filled with a new, clean charge on the intake stroke.

Intake

Poor rings allow air and oil to be sucked up into the combustion chamber. This leakage of air varies the mixture and makes the charges uniform. The excess oil burns in the combustion chamber, causing smoky exhausts and carbon-fouled spark plugs, valve trouble and oil wastage.

Why Better Piston Rings Mean Power and Economy



The big question with owners today is how to get better motor service—increase power and save fuel and oil. More old cars are being run today and the principal trouble in most of them is a shortage of power.

Owners need a lot of education on piston rings. This inside view of a motor in our general advertising copy shows where piston rings are used and what they do. Owners can see that while piston ring leakage may seem trifling in a single motor revolution, it is something to reckon with when multiplied by 1200 to 3000 r.p.m.

It needs correction as much as would a leak in the gasoline tank. That's why it pays to put in the best piston rings obtainable.

A Full Set of

McQUAY-NORRIS **LEAK-PROOF** PISTON RINGS

pays in power—in economy—in a clean, dependable motor.

For over seven years McQuay-Norris **LEAK-PROOF** Piston Rings have been improving motors—making them run better—stopping waste of gasoline and oil. They are not an experiment—not a theory—but time-tried and proven. Giving satisfaction in hundreds of thousands of motors.

More than 300 complete service stocks of all standard size and over-size rings are distributed over the country—quickly obtainable through your jobber or supply house. Over 2000 different unusual sizes and over-sizes kept ready on hand at the factory for immediate shipment anywhere.

There's a lot of piston ring business for you in supplying the demand for McQuay-Norris **LEAK-PROOF**. Best known—easiest to sell—sure to give satisfaction—any size promptly supplied—good profit on every installation.

SEND FOR FREE BOOKLET

"To Have and to Hold Power"—a mighty useful little summary of the piston ring and power question. Every garage and repair man will find it helpful in his business. Write Dept. M.

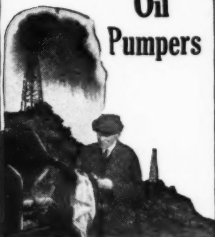
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For Those
Oil
Pumpers



McQUAY-NORRIS
Superoyl
RINGS

Have an oil reservoir that collects all the excess oil from the cylinder wall leaving just the film necessary for proper lubrication. Used in top grooves only of each piston with McQuay-Norris **Superoyl** Piston Rings in lower grooves to insure maximum compression, power and fuel economy.



HOWE

Kork Tred

PAT. PENDING
CLAIMS ALLOWED

Makes FORDS Alert

Ford owners, who replace ordinary transmission linings with Kork Tred, note instantly the increased efficiency of their cars.

The stop is short when brakes are applied. The getaway is quick and smooth. The Ford is ever alert and responsive as gears are shifted forward or back into reverse.

The slipping, the grabbing, the jerking, the annoying chatter of complaining transmissions have been eliminated. All the motor power is applied to the rear wheels.

An Efficiency That Lasts

At 5,000 miles or more, Kork Tred has the same velvet grip and bulldog hold as when this perfected cork-inlaid transmission lining was first installed.

In an equal period of use, three sets of ordinary transmission linings would have worn glassy smooth, necessitating three replacements at a cost of \$15 at least.

The price of Kork Tred, moreover, is ridiculously low, judged by the increased efficiency it gives, the lasting service it renders, and the replacement expense it saves. Kork Tred retails for \$3 a set. Sold only in the green carton. Three strips cut to length with rivets for attaching.

Clincher Cups—An Exclusive Feature

The cork discs cannot come out. They are securely held in clincher cups, firmly riveted in the fabric, which is tough and closely woven of the finest South Sea Island cotton. These clincher cups are exclusive to Kork Tred.

DEALERS can recommend Kork Tred with the satisfying knowledge that their customers will be satisfied. Write for trade discounts. Take advantage of the merited success of Kork Tred. Your jobber can probably supply you, for the leading jobbers carry Kork Tred in stock.

NOTE—On and after August 10, Howe Searchlight No. 5 will list at \$5.50 and No. 15 at \$4.50.

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